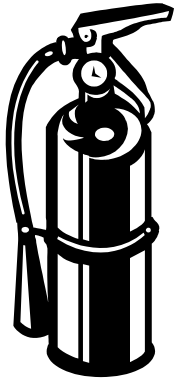


Requirements For Fire Protection & Means of Exit



DEPARTMENT OF LABOR MISSION STATEMENT

To promote an equitable relationship between management and labor, to ensure employee safety and health in the workplace, to provide resourceful administration of the workers compensation program with the expeditious and equitable resolution of claims, and to improve the standard of living of all Kentuckians.

EDUCATION & TRAINING MISSION STATEMENT

To promote and provide timely expert safety and health assistance to employers and employees to ensure, as far as possible, every worker in the commonwealth safe and health working conditions.

FOREWORD

The material contained in this pamphlet is taken from 29 Code of Federal Regulations (CFR) 1910, Subparts "E" and "L", of the Kentucky Occupational Safety and Health Standards for General Industry as adopted by the Kentucky Occupational Safety and Health Standards Board.

Essentially, this pamphlet highlights the requirements for providing safe means of exit from fire and other emergencies (Subpart "E") and for portable fire protection equipment, fixed fire protection systems and fire brigades ("Subpart "L"). Its purpose is to help employers and employees recognize their responsibilities and the safety requirements in these particular areas. It should be emphasized that this pamphlet is only a guide to hazard recognition, and compliance with the requirements listed here does not necessarily assure full compliance with all Kentucky occupational safety and health standards. Should you have additional questions on the subjects covered in this pamphlet, please address them to one of the offices listed on the back cover of this booklet.

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SUBPART E – Exit Routes, Emergency Action Plans & Fire Prevention Plans

1910.36 DESIGN AND CONSTRUCTION REQUIREMENTS FOR EXIT ROUTES

1910.36(a) Basic requirements. Exit routes must meet the following design and construction requirements: **(1) An exit route must be permanent.** Each exit route must be a permanent part of the workplace.

1910.36(a)(2) An exit must be separated by fire resistant materials. Construction materials used to separate an exit from other parts of the workplace must have a one-hour fire resistance-rating if the exit connects three or fewer stories and a two-hour fire resistance-rating if the exit connects four or more stories.

1910.36(a)(3) Openings into an exit must be limited. An exit is permitted to have only those openings necessary to allow access to the exit from occupied areas of the workplace, or to the exit discharge. An opening into an exit must be protected by a self-closing fire door that remains closed or automatically closes in an emergency upon the sounding of a fire alarm or employee alarm system. Each fire door, including its frame and hardware, must be listed or approved by a nationally recognized testing laboratory. Section 1910.155(c)(3)(iv)(A) of this part defines "listed" and § 1910.7 of this part defines a "nationally recognized testing laboratory."

1910.36(b) The number of exit routes must be adequate.(1) Two exit routes. At least two exit routes must be available in a workplace to permit prompt evacuation of employees and other building occupants during an emergency, except as allowed in paragraph (b)(3) of this section. The exit routes must be located as far away as practical from each other so that if one exit route is blocked by fire or smoke, employees can evacuate using the second exit route.

1910.36(b)(2) More than two exit routes. More than two exit routes must be

available in a workplace if the number of employees, the size of the building, its occupancy, or the arrangement of the workplace is such that all employees would not be able to evacuate safely during an emergency.

1910.36(b)(3) A single exit route. A single exit route is permitted where the number of employees, the size of the building, its occupancy, or the arrangement of the workplace is such that all employees would be able to evacuate safely during an emergency.

Note to paragraph 1910.36(b): For assistance in determining the number of exit routes necessary for your workplace, consult NFPA 101-2000, Life Safety Code.

1910.36(c) Exit discharge. (1) Each exit discharge must lead directly outside or to a street, walkway, refuge area, public way, or open space with access to the outside.

1910.36(c)(2) The street, walkway, refuge area, public way, or open space to which an exit discharges leads must be large enough to accommodate the building occupants likely to use the exit route.

1910.36(c)(3) Exit stairs that continue beyond the level on which the exit discharge is located must be interrupted at that level by doors, partitions, or other effective means that clearly indicate the direction of travel leading to the exit discharge.

1910.36(d) An exit door must be unlocked. (1) Employees must be able to open an exit route door from the inside at all times without keys, tools, or special knowledge. A device such as a panic bar that locks only from the outside is permitted on exit discharge doors.

ADVISORY: Any device used to keep a an exit door closed such as a lock in knob, barrel bolt, hasp, etc. must have the ability to release and open the door with one motion by the employee.

1910.36(d)(2) Exit route doors must be free of any device or alarm that could restrict emergency use of the exit route if the device or alarm fails.

1910.36(d)(3) An exit route door may be locked from the inside only in mental, penal, or correctional facilities and then only if supervisory personnel are

continuously on duty and the employer has a plan to remove occupants from the facility during an emergency.

1910.36(e) A side-hinged exit door must be used. (1) A side-hinged door must be used to connect any room to an exit route.

1910.36(e)(2) The door that connects any room to an exit route must swing out in the direction of exit travel if the room is designed to be occupied by more than 50 people or if the room is a high hazard area (*i.e.*, contains contents that are likely to burn with extreme rapidity or explode).

1910.36(f) The capacity of an exit route must be adequate.(1) Exit routes must support the maximum permitted occupant load for each floor served.

1910.36(f)(2) The capacity of an exit route may not decrease in the direction of exit route travel to the exit discharge.

Note to paragraph 1910.36(f): Information regarding "Occupant load" is located in NFPA 101-2000, Life Safety Code.

1910.36(g) An exit route must meet minimum height and width requirements.(1) The ceiling of an exit route must be at least seven feet six inches (2.3 m) high. Any projection from the ceiling must not reach a point less than six feet eight inches (2.0 m) from the floor.

1910.36(g)(2) An exit access must be at least 28 inches (71.1 cm) wide at all points. Where there is only one exit access leading to an exit or exit discharge, the width of the exit and exit discharge must be at least equal to the width of the exit access.

1910.36(g)(3) The width of an exit route must be sufficient to accommodate the maximum permitted occupant load of each floor served by the exit route.

1910.36(g)(4) Objects that project into the exit route must not reduce the width of the exit route to less than the minimum width requirements for exit routes.

ADVISORY: Objects such as doors from adjacent rooms, lockers, file cabinets, trash receptacles, etc. must not reduce exit route widths below minimum requirements.

1910.36(h) An outdoor exit route is permitted. (1) The outdoor exit route must have guardrails to protect unenclosed sides if a fall hazard exists;

1910.36(h)(2) The outdoor exit route must be covered if snow or ice is likely to accumulate along the route, unless the employer can demonstrate that any snow or ice accumulation will be removed before it presents a slipping hazard;

1910.36(h)(3) The outdoor exit route must be reasonably straight and have smooth, solid, substantially level walkways; and

1910.36(h)(4) The outdoor exit route must not have a dead-end that is longer than 20 feet (6.2 m).

[FR 67 67962, Nov. 7, 2002]

1910.37 MAINTENANCE, SAFEGUARDS, AND OPERATIONAL FEATURES FOR EXIT ROUTES

1910.37(a) The danger to employees must be minimized. (1) Exit routes must be kept free of explosive or highly flammable furnishings or other decorations.

1910.37(a)(2) Exit routes must be arranged so that employees will not have to travel toward a high hazard area, unless the path of travel is effectively shielded from the high hazard area by suitable partitions or other physical barriers.

1910.37(a)(3) Exit routes must be free and unobstructed. No materials or equipment may be placed, either permanently or temporarily, within the exit route. The exit access must not go through a room that can be locked, such as a bathroom, to reach an exit or exit discharge, nor may it lead into a dead-end corridor. Stairs or a ramp must be provided where the exit route is not substantially level.

1910.37(a)(4) Safeguards designed to protect employees during an emergency (*e.g.*, sprinkler systems, alarm systems, fire doors, exit lighting) must be in proper working order at all times.

1910.37(b) Lighting and marking must be adequate and appropriate.

(1) Each exit route must be adequately lighted so that an employee with normal vision can see along the exit route.

1910.37(b)(2) Each exit must be clearly visible and marked by a sign reading "Exit".

1910.37(b)(3) Each exit route door must be free of decorations or signs that obscure the visibility of the exit route door.

1910.37(b)(4) If the direction of travel to the exit or exit discharge is not immediately apparent, signs must be posted along the exit access indicating the direction of travel to the nearest exit and exit discharge. Additionally, the line-of-sight to an exit sign must clearly be visible at all times.

1910.37(b)(5) Each doorway or passage along an exit access that could be mistaken for an exit must be marked "Not an Exit" or similar designation, or be identified by a sign indicating its actual use (*e.g.*, closet).

1910.37(b)(6) Each exit sign must be illuminated to a surface value of at least five foot-candles (54 lux) by a reliable light source and be distinctive in color. Self-luminous or electroluminescent signs that have a minimum luminance surface value of at least .06 footlamberts (0.21 cd/m^2) are permitted.

1910.37(b)(7) Each exit sign must have the word "Exit" in plainly legible letters not less than six inches (15.2 cm) high, with the principal strokes of the letters in the word "Exit" not less than three-fourths of an inch (1.9 cm) wide.

1910.37(c) The **fire retardant properties of paints or solutions must be maintained.** Fire retardant paints or solutions must be renewed as often as necessary to maintain their fire retardant properties.

1910.37(d) Exit routes must be maintained during construction, repairs, or alterations. (1) During new construction, employees must not occupy a workplace until the exit routes required by this subpart are completed and ready for employee use for the portion of the workplace they occupy.

1910.37(d)(2) During repairs or alterations, employees must not occupy a workplace unless the exit routes required by this subpart are available and existing fire protections are maintained, or until alternate fire protection is furnished that provides an equivalent level of safety.

1910.37(d)(3) Employees must not be exposed to hazards of flammable or explosive substances or equipment used during construction, repairs, or

alterations, that are beyond the normal permissible conditions in the workplace, or that would impede exiting the workplace.

1910.37(e) An employee alarm system must be operable. Employers must install and maintain an operable employee alarm system that has a distinctive signal to warn employees of fire or other emergencies, unless employees can promptly see or smell a fire or other hazard in time to provide adequate warning to them. The employee alarm system must comply with § 1910.165.

[39 FR 23502, June 27, 1974, as amended at 45 FR 60703, Sept. 12, 1980; 67 FR 67963, Nov. 7, 2002]

1910.38 EMERGENCY ACTION PLAN

This section applies to all emergency action plans which may be required by a particular OSH standard. However, the section does not, by itself, require the employer to establish and emergency action plan.

Definitions

Emergency Action Plan - A plan for a workplace, or parts thereof, describing what procedures the employer and employees must take to ensure employee safety from fire and other emergencies.

Emergency Escape Route - The route that employees are directed to follow in the event they are required to evacuate the workplace or seek a designated refuge area.

Fire Warden - An employee designated to assist in the evacuation of employees from the workplace.

APPLICATION

1910.38(a) An employer must have an emergency action plan whenever an OSH standard in this part requires one. The requirements in this section apply to each such emergency action plan.

The section contains only the criteria to be followed in establishing emergency action plan which are or which will be required by other specific

OSH standards. For example, an employer can obtain certain exemptions from requirements of 1910.157 Portable Fire Extinguishers, if an emergency action plan is established in accordance with the requirements of this section. Further, in paragraph 1910.160(c)(1), the employer is required to provide an emergency action plan in accordance with 1910.38 for areas where total flooding fire extinguisher system use agents concentrations exceeding maximum safe levels.

ADVISORY: Employers who choose to evacuate employees or who may reasonably anticipate having to evacuate employees, due to 1910.1200 or 1910.120 chemical spills, must also comply with these requirements.)

1910.38(b) Written and oral emergency action plans. An emergency action plan must be in writing, kept in the workplace, and available to employees for review. However, an employer with 10 or fewer employees may communicate the plan orally to employees.

The emergency action plan should address emergencies that the employer may reasonably expect in the workplace.

TYPES OF EMERGENCIES THAT NEED PLANS

- (A) Fire and explosion
- (B) Severe weather
- (C) Earthquake
- (D) Hazardous materials spill and leaks
- (E) Bomb threats
- (F) Medical
- (G) Workplace violence
- (H) Any other emergency that can be reasonably expected at your facility

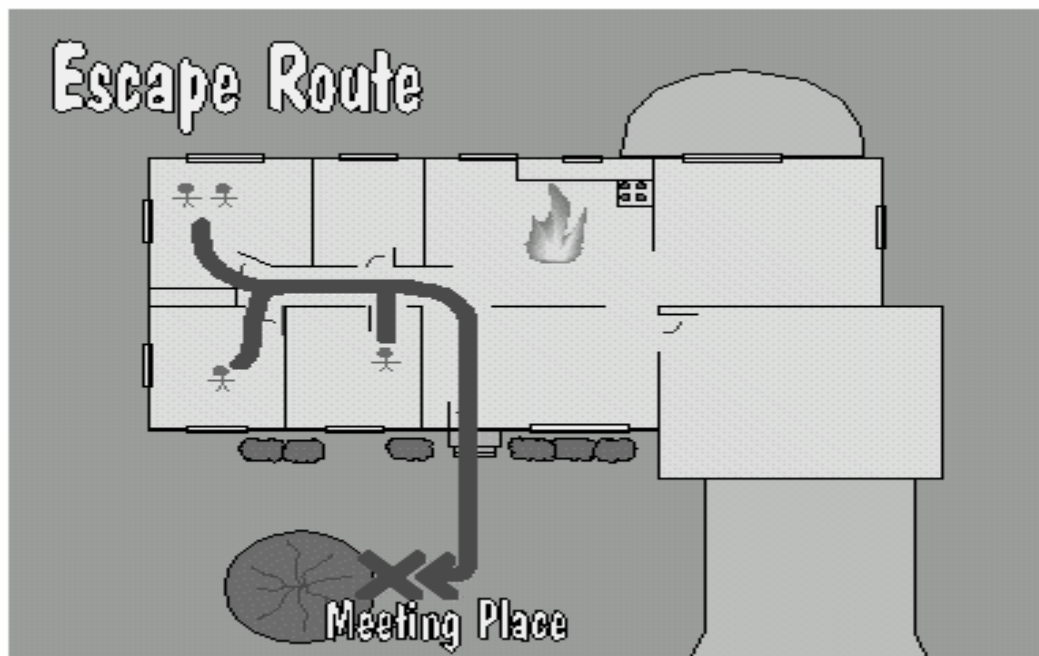
1910.38(c) Minimum elements of an emergency action plan. An emergency action plan must include at a minimum:

1910.38(c)(1) Procedures for reporting a fire or other emergency;

1910.38(c)(2) Procedures for emergency evacuation, including type of evacuation and exit route assignments;

At the time of an emergency, employees should know what type of evacuation is necessary and what their role is in carrying out the plan. In some cases where the emergency is very grave, total and immediate evacuation of all employees is necessary. In other emergencies, a partial evacuation of nonessential employees with a delayed evacuation of others may be necessary for continued plant operation. In some cases, only those employees in the immediate area of the fire may be expected to evacuate or move to a safe area such as when a local application fire suppression system discharge employee alarm is sounded. Employees must be sure that they know what is expected of them in all emergency possibilities which have been planned in order to provide assurance of their safety from fire or other emergencies.

The use of floor plans or workplace maps which clearly show the emergency escape routes should be included in the emergency action plan. Color coding will aid employees in determining their escape route assignments. Secondary escape route assignments as well as areas such as tornado shelters should also be included.



Example of an Emergency Escape Route Map

The designation of refuge or safe areas should be determined and identified in the plan. In a building divided into fire zones by fire walls, the refuge

area may be within the same building but in a different zone from where the emergency exists.

Exterior refuge or safe areas may include parking lots, open fields or streets which are located away from the site of the emergency and which provide sufficient space to accommodate the employees. Employees should be instructed to move away from the exit discharge doors of the building, and to avoid congregating close to the building where they may hamper emergency operations.

1910.38(c)(3) Procedures to be followed by employees who remain to operate critical plant operations before they evacuate;

The employer should list in detail the procedures to be taken by those employees who have been selected to remain behind to take care of essential plant operations until their evacuation becomes absolutely necessary. Essential plant operations may include:

- (1) the monitoring of plant power supplies, water supplies, and other essential services which cannot be shut down for every emergency alarm;
- (2) chemical or manufacturing processes which must be shut down in stages or steps where certain employees must be present to assure that safe shut down procedures are completed.

1910.38(c)(4) Procedures to account for all employees after evacuation;

After the desired degree of evacuation is completed, wardens or other designated employees should be able to account for or otherwise verify that all employees are in the safe areas.

1910.38(c)(5) Procedures to be followed by employees performing rescue or medical duties, and;

The employer should develop and explain in detail what rescue and medical first aid duties are to be performed and by whom. These duties should only be assigned to employees after they have been properly trained and equipped for these duties.

1910.38(c)(6) The name or job title of every employee who may be contacted by employees who need more information about the plan or an explanation of their duties under the plan.

1910.38(d) Employee alarm system. An employer must have and maintain an employee alarm system. The employee alarm system must use a distinctive signal for each purpose and comply with the requirements in § 1910.165.

1910.38(e) Training. An employer must designate and train employees to assist in a safe and orderly evacuation of other employees.

The employer should assure that an adequate number of employees are available at all times during working hours to act as evacuation wardens to that employees can be swiftly moved from the danger location to safe areas. Generally, one warden for each twenty (20) employees in the workplace should be able to provide adequate guidance and instruction at the time of a fire emergency. The employees selected or who volunteer to serve as wardens should be trained in the complete workplace layout and the various alternative escape routes from the workplace. All wardens and fellow employees should be made aware of handicapped employees who may need extra assistance, such as using the buddy system, and of hazardous areas to be avoided during emergencies. Before leaving, wardens should check rooms and other enclosed spaces in the workplace for employees who may be trapped or otherwise unable to evacuate the area.

1910.38(f) Review of emergency action plan. An employer must review the emergency action plan with each employee covered by the plan:

1910.38(f)(1) When the plan is developed or the employee is assigned initially to a job;

1910.38(f)(2) When the employee's responsibilities under the plan change; and

1910.38(f)(3) When the plan is changed.

[45 FR 60703, Sept. 12, 1980; FR 67 67963, Nov. 7, 2002]

EMERGENCY ACTION PLANS

Emergency action plans shall include, but not be limited to:

- (a) The preferred means of reporting fires and other emergencies;
- (b) Emergency escape procedures and emergency escape route assignments (map of the plant);
- (c) Procedures to be followed by employees who remain to operate and/or shut down critical plant operations before evacuate
- (d) Procedures to account for all employees after emergency evacuation has been completed;
- (e) Duties and responsibilities of personnel performing rescue and medical duties
- (f) Description of expected emergencies, their hazards and plan of action to combat the emergencies.
- (g) Names or regular job titles of persons or departments who can be contacted for further information or explanation of duties under the plan.
- (h) An alarm system which complies with 1919.165.
- (i) Outline the types of evacuations to be used in various emergency circumstances.
- (j) Provide training for designated fire wardens:
 - (1) when plan is established;
 - (2) when job assignments under the plan change, and;
 - (3) when the plan itself changes or at least quarterly.
- (k) Provide training:
 - (1) to all employees when the plan is established;
 - (2) to a new employee upon their initial assignment;
 - (3) to any employee when there is a change in job responsibilities, and;
 - (4) to all employees whenever the plan changed.
- (l) The plan must be in writing, kept in the workplace and made available for employee review. For those employers with 10 or fewer employees, the plan may be communicated orally and the employer need not to maintain a written plan.

(Sample Emergency Action Plan – Remove this before printing)

Insert Company Name

Emergency Action Plan

Insert Revision Date

Introduction

This Emergency Action Plan has been developed for Insert Company Name employees located at Insert The Address Of The Facility. This plan is written to comply with OSH Standard 1910.38 “Employee emergency plans and fire prevention”.

The appropriate elements of the Plan should be used in all emergencies that may arise at these facilities. The Plan will cover emergencies such as fires, medical emergencies, accidents, catastrophes, bomb threats, inclement weather, or other emergency situations requiring orderly evacuation or movement of employees or a coordinated response, of first aid responders.

The Plan will be reviewed annually and updated as necessary. Anyone recognizing changes that should be made to improve this document should notify one of the emergency coordinators.

Full evacuation drills involving all personnel at the facility will be conducted on an annual basis. Supplemental drills will be conducted as deemed necessary. Each drill will be evaluated to determine changes and other improvements that may need to be made to insure that the Plan is functioning and complete.

All new personnel will be trained on the Plan as part of the orientation for new employees. It is the responsibility of the coordinators to insure that appropriate information is communicated to any new personnel. Employees will also be notified of any changes that affect them. A current copy of the Plan will be on file in **Insert The Location Of The Plan**.

Employer's Responsibilities

1. The employer is responsible for the development and maintenance of an up-to-date Emergency Action Plan appropriate for the safe evacuation or other movement of employees and visitors.
2. The employer is responsible for the establishment of a chain of command to ensure the orderly implementation of the Plan.
3. The employer is responsible for the development of a training program to ensure that all employees are trained on their duties and responsibilities associated with the Plan.
4. The employer is responsible for the designation of a person to respond to news media inquiries should an incident occur.
5. The employer is responsible for conducting emergency evacuation drills annually or as frequently as necessary to ensure effectiveness of the Plan.
6. The employer is responsible for the testing and maintenance of alarm systems, radios, and other means of communication, emergency lighting, first-aid response capability, etc. to assure the orderly action, evacuation, accountability and safety of employees.
7. The employer is responsible for ensuring his company's compliance with the appropriate OSH Standards and Regulations.

Emergency Coordinators Evacuation Responsibilities

1. The first responsibility of the Emergency Coordinators is to get the sign in sheet and/or daily log sheet; this will assist in knowing who may be missing and know who the people are on the list.
2. Put on the orange vest, employees will be able to identify you as an emergency coordinator.
3. While exiting the facility, view your work area to ensure that co-workers have evacuated. Chief Coordinators will check all rooms isolated from the intercom systems.
4. Account for the employees that are on your sign in sheet. You will notify the Chief Coordinator if an employee is missing or everyone is accounted for. This will be done by radio or by messenger.
5. Ensure that all employees remain in the designated meeting area until an all-clear signal has been given by the Chief Coordinator or the Fire Department to go back into the building.
6. Return the sign-in sheet back to its proper place.
7. Notify the Chief Coordinator of any problems during the drill or emergency

Supervisor's/Manager's Responsibilities

1. Prior to evacuation, supervisors/managers shall designate personnel to provide assistance to employees or visitors who have a physical disability.
2. Supervisors/managers or their designated representatives are responsible to insure that all personnel are evacuated from their respective areas promptly and in a calm, orderly manner.
3. Supervisors/managers or their designated representatives are responsible to verify the evacuation of all assigned personnel and report the names and last known location of any unaccounted for personnel. This information must be communicated to the emergency coordinator immediately.
4. Supervisors/managers are responsible for providing safety information and coordinating the appropriate training of any new or existing personnel with the appropriate emergency coordinator.
5. Supervisors/managers are responsible for ensuring that visitors are escorted and accounted for at all times while on the premises.

Employee's Responsibilities

1. Employees are responsible for being familiar with the emergency evacuation plans and alternate routes of evacuation.
2. Employees are responsible for knowing and obeying safety requirements and agency procedures.
3. Employees are responsible for reporting any emergency situation, unsafe conditions or acts to their supervisor or emergency coordinator IMMEDIATELY.
4. Employees are responsible for reporting any injuries, regardless how minor it may be at the time, to their supervisor and emergency coordinator.
5. Employees are responsible for making their own safety and health of primary importance while performing their work duties.
6. Employees are responsible for making and keeping their workplace safe for themselves, other employees and guests.
7. Employees are not expected to use the fire extinguishers located in the building. However, employees may find it necessary to use fire extinguisher if their means of egress is blocked by.
8. Employees are responsible for ensuring that visitors are escorted and accounted for at all times while on the premises.

BOMB THREATS

1. If you receive a bomb threat by telephone, try to obtain as much information as possible. This form dealing with bomb threats should be kept near your telephone at all times. Attempt to keep the caller on the phone to learn at least the **FOUR W'S**:
 - A. WHEN- when is the bomb to detonate?
 - B. WHERE- where is the bomb located?
 - C. WHAT- what kind of bomb and what does it look like?
 - D. WHY- why did you place it?
2. Listen carefully to the caller to note distinguishing information and background noise.
3. Any bomb threat, delivered by any means, shall be reported to your Chief Coordinator. The Chief Coordinators will take appropriate action.
4. Any bomb threat shall be taken seriously and the building SHALL be evacuated. **Insert How Employees Will Be Notified Here** will be utilized as means of notification.
5. Leave the building immediately by the designated evacuation route and proceed to the designated assembly area, which should be at least 300 feet from the building. The assembly point will be **Insert Location Of Assembly Point.**
6. Emergency Coordinators will take roll call or otherwise ascertain that all personnel are accounted for.

GUIDELINES FOR HANDLING MAIL

Some facilities in communities around Kentucky have received suspected anthrax threat letters. Most were empty envelopes and some have had talcum powder in them. None have contained anthrax, or any other biological or chemical threat. The letters, when there was a letter in the envelope, have sometimes read something like “You have been exposed to anthrax....” These guidelines are intended to provide recipients of letters and packages which may contain anthrax (or other biological or chemical threat) with useful information and guidance to help them deal more effectively with an incident, should one occur. If you would like further information on these potential threats, please visit the Division of Emergency Management web site at: <http://kyem.dma.state.ky.us/>, or the Center for Disease Control web site at <http://www.bt.cdc.gov/Agent/Anthrax/Anthrax.asp>.

IMMEDIATE ACTION: DO NOT PANIC

WHAT TO DO IF YOU RECEIVE...

AN ENVELOPE WITH POWDER AND POWDER SPILLS OUT ONTO SURFACE.

- Place the envelope on your desk or floor immediately.
- Contact your supervisor immediately. If your supervisor is not available contact your building's Emergency Coordinator:
- Do not clean up the powder. Keep others away.
- Do not brush off your clothes.
- After your supervisor, or Emergency Coordinator, contacts you, you should wash your hands and exposed skin with soap and water. Do not use bleach unless otherwise directed by the Emergency Coordinator or health official.
- Remove clothing and place in a plastic bag as soon as possible. The bag should then be closed and placed in a second plastic bag. Clearly label and identify contents. Retain for law enforcement, as it may be evidence.

- Shower with soap and water as soon as possible at home. Do not use bleach or other disinfectant.
- Put on fresh clothing.
- You, or your supervisor, should make a list of all people (names, addresses and phone numbers) who had contact with the powder and give the list to local public health authorities. Those individuals may be instructed to watch for fever or other symptoms over the next couple of days.

AN UNOPENED LETTER OR LETTER THAT APPEARS EMPTY:

- Place the envelope on your desk or back to where you picked it up.
- Notify your supervisor, or Emergency Coordinator.
- Keep others away.
- After your supervisor or Emergency Coordinator contacts you, you should wash your hands and exposed skin with soap and water. Do not use bleach unless given permission to do so by the Emergency Coordinator or a health official.

A PACKAGE MARKED WITH A THREATENING MESSAGE SUCH AS "ANTHRAX":

- Do not open the package.
- Do not move the package and evacuate the room.
- Notify your supervisor, or Emergency Coordinator.
- Keep others from entering.

**IF YOU WITNESS “AEROSILIZATION” (AN UNKNOWN MIST),
SMALL EXPLOSION, OR A LETTER STATING "ANTHRAX IN
HEATING SYSTEM":**

- Leave the room immediately.
- Notify your supervisor, or Emergency Coordinator.
- Supervisor or Emergency Coordinator should;
 - *Secure entry and exits to prevent strangers from exiting or other persons from entering the area.
 - *Shut down air handling system.
 - *Remain on the premises until responders arrives.
 - *Make a list of all people (names, addresses and phone numbers) who were in the building at the time and give to local public health authorities. They may be instructed to watch for fever or other symptoms over the next couple of days.

SUSPICIOUS OR UNLABELED MAIL:

- Do not move the letter/package.
- Notify your supervisor or Emergency Coordinator.

Some characteristics of suspicious packages and letters include the following:

- Excessive postage
- Handwritten or poorly typed addresses
- Incorrect titles
- Title, but no name
- Misspellings of common words
- Oily stains, discoloration or odor

- No return address
- Excessive weight
- Lopsided or uneven envelope
- Protruding wires or aluminum foil
- Excessive security material such as masking tape, string, etc.
- Visual distractions
- Ticking sound
- Marked with restrictive endorsements, such as “Personal” or “Confidential”
- Shows a city or state in the postmark that does not match the return address

Protective gloves and plastic bags have been made available throughout the building.

EARTHQUAKE

1. Keep calm, do not run or panic!
2. Remain where you are; if indoors, stay indoors. You should do one or more of the following;
 - A. Seek shelter under sturdy furniture;
 - B. Stand in a doorway or against a wall;
 - C. Stay near the center of the building if possible;
 - D. Stay away from windows, storage racks, and stacked material.
3. Do not attempt to leave the building unless conditions there threaten your safety or you are instructed to do so; additional hazards may be present outside the building.
4. Do not use any electrical devices (including lighting), candles, matches, or any open flame.
5. If outside of the building, stay in an open area away from buildings, bridges, utility poles and wires, hillsides and large trees.
6. If in a moving car, stop, and stay inside. Do not park near buildings, bridges, utility poles and wires, hillsides or large trees.
7. After the emergency is over, supervisors shall account for their assigned personnel and notify their Emergency Coordinator.
8. Secure medical attention for any injured person.
9. Be alert for aftershocks.

SEVERE WEATHER

1. The Office of Kentucky Emergency Management (formerly DES) continuously monitors weather conditions statewide. The presence of severe weather that could pose a threat to employees is communicated through their Alert System. Once engaged the Chief Emergency Coordinator will assume Incident Command.
2. **TORNADO WARNING:** Upon announcement of a tornado warning the Office of Administrative Services will provide notification to building operators for all employees to take shelter in their designated area. The shelter areas are the restrooms and inner hallways in the middle of the building. If there are visitors in the building they will be escorted to this area.
3. **SEVERE STORM:** Seek shelter inside a safe building. Stay away from **WINDOWS, OUTSIDE DOORS, and EXTERIOR WALLS.** Avoid unprotected corridors facing the oncoming winds. Seek protection from flying debris, particularly glass. **EXAMPLE:** A sitting or kneeling positions with hands protecting the back of the head and neck. Use a coat, jacket, book, etc., as a shield and face away from glass flying.

CHEMICAL SPILLS AND EMERGENCIES

In the event of a chemical or electrical emergency all employees of **Insert Company Name** shall be notified to exit through designate exits and proceed to a safe place away from the emergency. Fire wardens should provide guidance to safe areas and provide help to anyone needing assistance. First aid responders should attempt to aid injured individuals if they can do so without endangering their own safety.

Employees should not leave the safe area unless conditions require it or unless instructed to do so by an Emergency Coordinator or Fire Department personnel.

Emergency coordinators shall account for all employees as soon as possible.

During this type of emergency the **Insert Name of Local Fire Department** Fire Department shall be notified to handle the emergencies. **(Or Insert the Procedures That You Want Your Company To Follow)** The Fire Department or your Emergency Coordinator will notify you when it is safe to return to the facility.

MEDICAL EMERGENCY

1. In the event of a medical emergency, **Insert Company Name** First Aid Responders will be notified to assist in the care of the victim. If you are not trained in First Aid or CPR you should immediately contact the closest First Aid Responder. Do not expose yourself to possible Bloodborne Pathogens, such as HIV or HBV.
2. First Aid and bloodborne pathogen equipment is provided at no cost to First Aid Responders.
3. All bloodborne pathogen information is in the Exposure Control Plan.
4. Training for all designated First Aid Responders of **Insert Company Name** will be conducted at the initial time of assignment and repeated before certification expires.
5. Universal Precautions shall be practiced during all care of victims. All First Aid Responders shall wear the necessary PPE (Personal Protective Equipment) to reduce or eliminate exposure to blood or other potentially infectious materials.

The following is a list of First Aid Responders:

FIRE EMERGENCY

1. In case of fire, pull the fire alarm box in order to notify employees to evacuate the building and go to their designated areas. If no fire alarm box is available, contact the reception desk operator and have them call 911. Notify your supervisor if you can do so safely.
2. **Insert Company Name** employees are not expected to extinguish the fire. If your exit path is blocked by fire, follow the secondary exit route or use a fire extinguisher to assist you in exiting the building.
3. Once at their designated area, employees shall remain there unless instructed to leave by their supervisor, Emergency Coordinator or Fire Department personnel.
3. At the designated area, each Emergency Coordinator will get a count of employees and report to the Chief Coordinator. For the Emergency Coordinators responsibilities, see the front section of the Emergency Action Plan.
4. No one is to re-enter the building for any reason; all rescues will be conducted by the **Insert Name of Fire Department** Fire Department. The Emergency Coordinator will notify you when it is safe to re-enter the building.

The designated meeting place for this area of your facility is **Insert Designated Meeting Place**.

POLICY STATEMENT ON DOMESTIC VIOLENCE AND SEXUAL ASSAULT IN THE WORKPLACE

This policy statement is being issued to affirm the **Insert Company Name** support of the Zero Tolerance Policy for Domestic and Sexual Assault in the Workplace.

All employees of the **Insert Company Name** who are victims of domestic or sexual violence shall have access to immediate assistance.

All employees of the **Insert Company Name** seeking to protect themselves shall be allowed to adjust their work schedules and to use leave time (paid or unpaid) in order to obtain medical treatment, legal assistance, or make other arrangements to ensure safety.

All employees are urged to make themselves fully aware of their surroundings, as well as the surroundings of their co-workers.

Insert Company Name Domestic Violence Response Plan

Non-Immediate Threats

This plan is designed for any **Insert Company Name** employee that may be a victim of domestic violence and would like to meet with someone in order to receive information about his or her rights as a victim. The **Insert Company Name** Personnel Office will serve as the point of contact for the **Insert Company Name**.

* If you believe you are a victim of domestic violence and would like to meet with someone to know what your rights are and what resources are available, please contact the **Insert Company Name** Personnel Office.

* Once you contact the **Insert Company Name** Personnel Office, a representative will be available to meet with you on a confidential basis, inform you of your rights, and what resources are available to you.

Immediate Threat

This plan is designed for **Insert Company Name** employees that may be a victim of domestic violence when there is an immediate threat against this person while in the workplace. The **Insert Company Name** Personnel Office will serve as the point of contact for the **Insert Company Name** and should be contacted immediately.

* Any threatened employee should contact the **Insert Company Name** Personnel Office. The employee will then be taken to a safe location while the appropriate law enforcement agencies respond and make contact with the alleged offender or perpetrator.

* Once the employee is taken to the "safe place" the employee will be given information about victim's rights and what resources are available.

* The designated "safe place" will be kept confidential to ensure the safety of the employee until he/she is able to leave the building safely.

Considerations for Supervisors/Managers

No supervisor/manager is obligated to take action in a situation where they have determined that such action may create a threat to their own safety. However, this determination must be reported as soon as possible to the **Insert Company Name** Personnel Office as required by the current Workplace Violence Policy. The following are suggested safety measures that may be implemented as part of the safety plan.

- * Cultivate an environment of trust and acceptance that encourages employees to discuss victimization issues in order to tailor a plan that meets the unique needs of each employee.
- * Relocate the employee's workstation.
- * Change the employee's work schedule or phone number.
- * Provide receptionist and security personnel with photographs and descriptions of alleged offenders, at the victim's request. If a crisis occurs, this information will be vital to potential law enforcement intervention.
- * Discuss with the employee the possibility of a leave of absence, if threats escalate and become acute.
- * Provide escort or observation for victims entering or leaving the workplace. An evaluation of access and illumination of the parking lot for the employee may also be needed.
- * Allow the employee to use leave time in order to access resources such as court appearances, shelters or outreach services.
- * Limit employee information that is disclosed by phone or e-mail in company directories. Giving information related to the location of an employee may increase the level of risk
- * Encourage victims to provide copies of any civil order of protection that includes provisions related to the workplace.

- * Victimized employees should be encouraged to identify an emergency contact should the employer be unable to contact them.
- * Calls to the employee should be screened if at all possible and any threatening voice or e-mail messages should be saved.

Domestic Violence Information Packet

This packet will include information on the following subjects:

- * Protective orders available and those who are eligible to get protective orders.
- * Emergency Contact numbers for your area.
- * Definition of laws pertaining to domestic violence.
- * Information on the following resources that are available:

National Domestic Violence Hotline
Rape, Abuse and Incest National Network Hotline
Kentucky Employee Assistance Program
Listing of Kentucky's Regional Domestic Violence Program
Listing of Kentucky's Regional Rape Crisis Centers.

- * Plan of action in case you must leave your home.

Workplace Safety Plan For Supervisors and Managers

If an employee is victimized in the workplace, the development of a specific, detailed safety plan can significantly decrease the level of danger to the identified victim and enhance the overall safety of the workplace. The following recommendations for supervisory staff and employees can aid in the development of a systematic and standardized safety assessment. Implementation of a safety plan by any supervisor should be done in conjunction with victimized employee.

Providing Safety for Victims

- * Cultivate an environment of trust and acceptance that encourages employees to discuss victimization issues in order to tailor a plan that meets the unique needs of each employee.
- * Relocate the employee's workstation.
- * Change the employee's work schedule or phone number.
- * Provide receptionist and security personnel with photographs and descriptions of alleged offenders, at the victim's request. If a crisis occurs, this information will be vital to potential law enforcement intervention.
- * Discuss with the employee the possibility of a leave of absence, if threats escalate and become acute.
- * Provide escort or observation for victims entering or leaving the workplace. Employers may also need to evaluate parking access and illumination.
- * Allow the employee to use leave time in order to access resources such as court appearances, shelters or outreach services.
- * Limit employee information that is disclosed by phone or e-mail in company directories. Any information given related to the location of an employee may increase the level of risk.
- * Encourage victims to provide copies of any civil order of protection that includes provisions related to the workplace.

Responding to the Risk Posed by an Offending Employee

- * Immediately contact law enforcement if the employee currently poses a threat to the victim or other employees.
- * Report any suspected abuse of a spouse to your supervisor for assistance or (911).
- * Attempt to determine if the domestic violence or sexual assault occurred during the performance of the employee's job; was facilitated through the misuse of the workplace resources (i.e. phone, computer, fax machine); or involved misusing job related authority in order to negatively affect victims, assist in locating victims or perpetrate these crimes.
- * Take corrective or disciplinary action in order to reduce the level of danger in the workplace and to hold the offender accountable for the behavior.

Although it is impossible to anticipate every potential danger in the workplace, the employer can significantly enhance safety through the above listed actions. Each workplace presents unique opportunities and challenges; thus employers should initiate the discussion of safety planning prior to an identified threat in an effort to prevent future danger to employees.

Workplace Safety Plan For Victimized Employees

A safety plan is a victim's detailed strategy for preventing domestic violence and rape. A victim must direct the course of safety planning with the assistance of concerned individuals in order to ensure effective utilization of the plan in time of crisis. In addition to increasing a victim's ability to protect her or himself, an effective safety plan can help a victim continually assess the level of danger from the offender. Consistent emotional support from friends, co-workers and professionals often contributes to a victim's ability to resist an offender's manipulation and increases the victim's conviction that planning for her or his safety in the ultimate empowering act.

The following tasks may significantly enhance a victim's safety:

- * Talk with a trusted co-worker or supervisor and let them know if you have a safety concern related to domestic violence or sexual assault.
- * Review the layout of your workplace and discuss "safe areas" for use if the offender appears.
- * Ask a co-worker or supervisor to contact law enforcement if the offender threatens, attacks or stalks you at work.
- * Identify an emergency contact should your employer be unable to reach you.
- * Have your calls screened or remove your name and number from automatic phone directories.
- * Save any threatening voice or e-mail messages.
- * Arrange to park closer to your workplace and discuss having another employee or security personnel escort you to your vehicle.
- * Ask your employer if additional security measures are available, i.e. silent alarms or cell phones.
- * Review the safety of your child-care arrangements.
- * Provide your employer with a copy of any civil protective orders.

* Get information concerning the physical/mental health consequences of the abuse from your Employee Assistance Program, your primary care physician, your therapist, or a Domestic Violence Program or Rape Crisis Center.

1910.39 – FIRE PREVENTION PLANS

ADVISORY: A plan is required if the employer chooses not to fight fires in their facility. It is **recommended** that all employers develop a plan even if you are going to fight the fire. These plans should include recognition and control of workplace hazards, control of ignition sources, proper housekeeping practices, and a roster of fire safety maintenance personnel.

1910.39(a) Application. An employer must have a fire prevention plan when an OSHA standard in this part requires one. The requirements in this section apply to each such fire prevention plan.

1910.39(b) Written and oral fire prevention plans. A fire prevention plan must be in writing, be kept in the workplace, and be made available to employees for review. However, an employer with 10 or fewer employees may communicate the plan orally to employees.

1910.39(c) Minimum elements of a fire prevention plan. A fire prevention plan must include:

1910.39(c)(1) A list of all major fire hazards, proper handling and storage procedures for hazardous materials, potential ignition sources and their control, and the type of fire protection equipment necessary to control each major hazard;

1910.39(c)(2) Procedures to control accumulations of flammable and combustible waste materials;

It is the intent of this standard to assure that hazardous accumulations of combustible waste materials are controlled so that a fast developing fire, rapid spread of toxic smoke, or an explosion will not occur. This does not necessarily mean that each room needs to be swept each day. Employers and employees should be aware of the hazardous properties of materials in their workplaces, and the degree of hazard each poses. Certainly oil soaked rags have to be treated differently than general paper trash in office areas. However, large accumulations of waste paper or corrugated boxes, etc., can pose a significant fire hazard. Accumulations of materials which can cause large fires or generate dense smoke that are easily ignited or may start form spontaneous combustion are the types of materials with which this standard is concerned. Such materials may be easily ignited by matches, welders sparks, cigarettes and similar low level ignition sources.

1910.39(c)(3) Procedures for regular maintenance of safeguards installed on heat-producing equipment to prevent the accidental ignition of combustible materials;

Certain equipment is often installed in workplaces to control heat sources for to detect fuel leaks. An example is a temperature limit switch often found on deep fat food fryers in restaurants. There may be similar switches for high temperature dip tanks, or flame failure and flashback arrest devices on furnaces and similar heat producing equipment. If these devices are not properly maintained or they become inoperative, a definite fire hazard exists. Again, employees and supervisors should be aware of the specific type of control devices on equipment involved with combustible materials in the workplace and should make sure, through periodic inspections and testing, that these controls are operable. Manufacturer's recommendations should be followed to assure proper maintenance procedures.

1910.39(c)(4) The name or job title of employees responsible for maintaining equipment to prevent or control sources of ignition or fires; and

1910.39(c)(5) The name or job title of employees responsible for the control of fuel source hazards.

1910.39(d) Employee information. An employer must inform employees upon initial assignment to a job of the fire hazards to which they are exposed. An employer must also review with each employee those parts of the fire prevention plan necessary for self-protection. [FR 67 67963, Nov. 7, 2002]

ADVISORY: Although, not required, it is highly recommended that all training have written documentation.

The fire prevention plan shall be in writing, unless for 10 or fewer employees, and include, but not be limited to:

- (a) A list of major workplace fire hazards;
- (b) Proper handling and storage procedures for hazardous materials;
- (c) Procedures for control of potential ignition sources (welding, smoking, etc);
- (d) Procedures for controlling accumulations of flammable and combustible waste and for housekeeping;
- (e) Procedures for maintaining fire protection equipment or systems needed to control a fire involving the fire hazards;

- (h) Names or personnel for the maintenance of fire protection equipment and systems, and;
- (f) Names of personnel responsible for control of fuel source hazards.

(SAMPLE FIRE PREVENTION PLAN – REMOVE BEFORE PRINTING)

(* But not limited to this. Your company might have to extend to this plan.)
(Remove before printing)

Insert Company Name

FIRE PREVENTION PLAN

Fire in the workplace does millions of dollars of damage to the workplace and killing and injuring people each year. **Insert Company Name** takes your safety seriously. This Fire Prevention Plan will help keep employees safe from fire. It is the responsibility of all employees in the **Insert Company Name** to follow and enforce the plan.

HAZARDS IN THE WORKPLACE

Smoking is one of the largest fire hazards in the United States. Smoking is prohibited in **Insert Company Name**; smoking is allowed in designated areas only. All smoking material should be extinguished properly.

Space heaters are used throughout the **Insert Company Name**, but there are some safety concerns when dealing with them. Heaters should be kept away from all flammable and combustible materials, such as paper, wood, plastic, gasoline and anything that can burn. Heaters should only be used when a person is working in the area and should not be left unattended. At the end of the workday, the heaters shall be turned off or unplugged. Portable space heaters shall be approved by a nationally recognized testing laboratory, U.L. (Underwriters Laboratory) as an example.

HOUSEKEEPING

Good housekeeping is an essential part of controlling fires. Work areas should be kept free of debris and combustible waste. Storage should not be within 18 inches of a sprinkler head; this will affect the activation and performance of the sprinkler system. There should not be any storage near heater, furnace, or other source of ignition.

FIRE PROTECTION EQUIPMENT

Fire extinguishers are located throughout this facility; these are not to be used by Insert Company Name employees. Insert Company Name employees are expected to immediately evacuate the premises in case of fire; NOT TO ATTEMPT TO FIGHT THE FIRE UNLESS YOUR EXIT ROUTE IS BLOCKED BY FIRE AND NO OTHER EXIT ROUTE IS AVAILABLE.

Sprinkler systems will help contain a fire if in proper working condition. No employee will tamper with or turn off the sprinkler system. The only people who can do this are the Insert Local Fire Department Name Fire Department during an emergency, or a representative from Name of Your Fire Protection Company and Address and Phone Number during maintenance or testing of the sprinkler system.

CONTROLLING ELECTRICITY AND GAS DURING AN EMERGENCY

The Insert Fire Department Name Fire Department will be in charge of controlling all utility emergencies. They will notify the appropriate organizations for controlling these hazards.

By knowing and controlling the workplace hazards, maintaining good housekeeping and following these guidelines in the Insert Company Name Fire Prevention Plan, employees will remain in a safe workplace. If you have, any questions contact your supervisor.

SUBPART L - Fire Protection

(1910.155 thru 1910.165)

On January 7, 1981, the Kentucky Occupational Safety and Health Program adopted revisions of safety standards for fire protection. A significant change within the realm of fire protection standards was the introduction of the "performance" standard, which provides employers with options and flexibility in meeting their particular needs for fire protection.

This section contains both performance and specification standards in addition to supplemental information, and is designed to provide the reader with a basic understanding of the requirements for fire protection. Various sections of the standards have been rearranged in an effort to categorize the subject matter.

MANAGEMENT DECISIONS

The employer's selection of a course of action regarding employee and fire protection depends on both the requirements and the needs of each individual employer. This decision is usually made by top management and requires careful consideration. The most important factors in providing adequate safety in a fire situation are the availability of proper exit facilities to assure ready access to safe areas, and the proper education of employees as to the actions to be taken in a fire emergency.

There are two basic options available to the employer:

Option 1: Employees will fight fires.

Option 2: Employees will not fight fires.

Once the employer has decided which option to take, he or she must comply with the specific criteria pertaining to that option. These criteria are outlined in the charts on the next four pages. Applicable standard numbers are included for easy reference.

Figure 1, 2 & 3

Option 1(a, b or c): Will Fight Fires

Figure 4

Option 2: Will Not Fight Fires

Figure 1

Option 1a: Will Fight Fires

All Employees

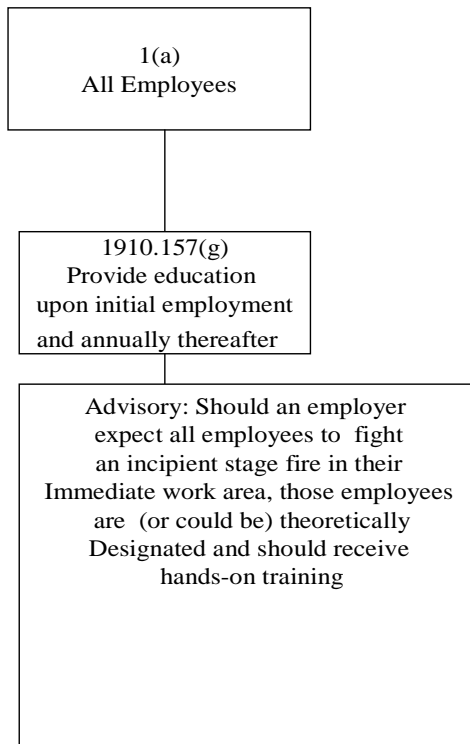


Figure 2

Option 1(b): Will Fight Fires

Selected or Designated Employees

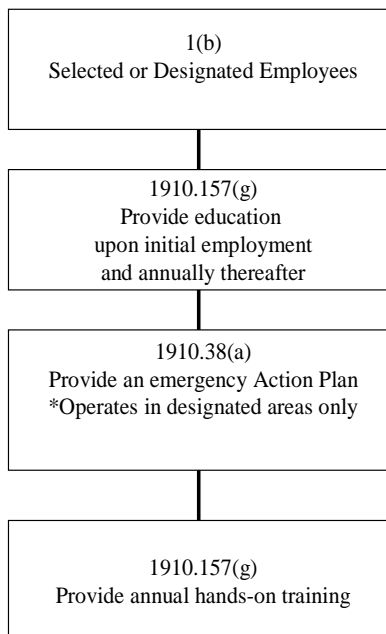


Figure 3

Option 1(c): Will Fight Fires

Fire Brigade (Organized Team)

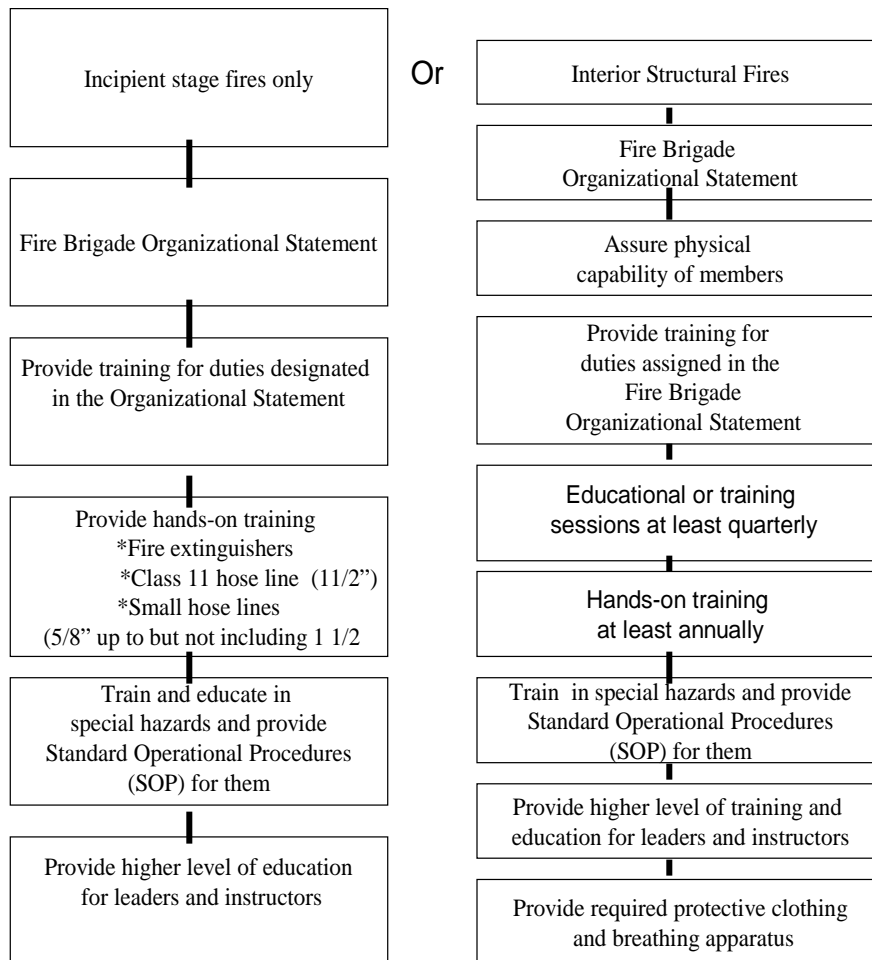
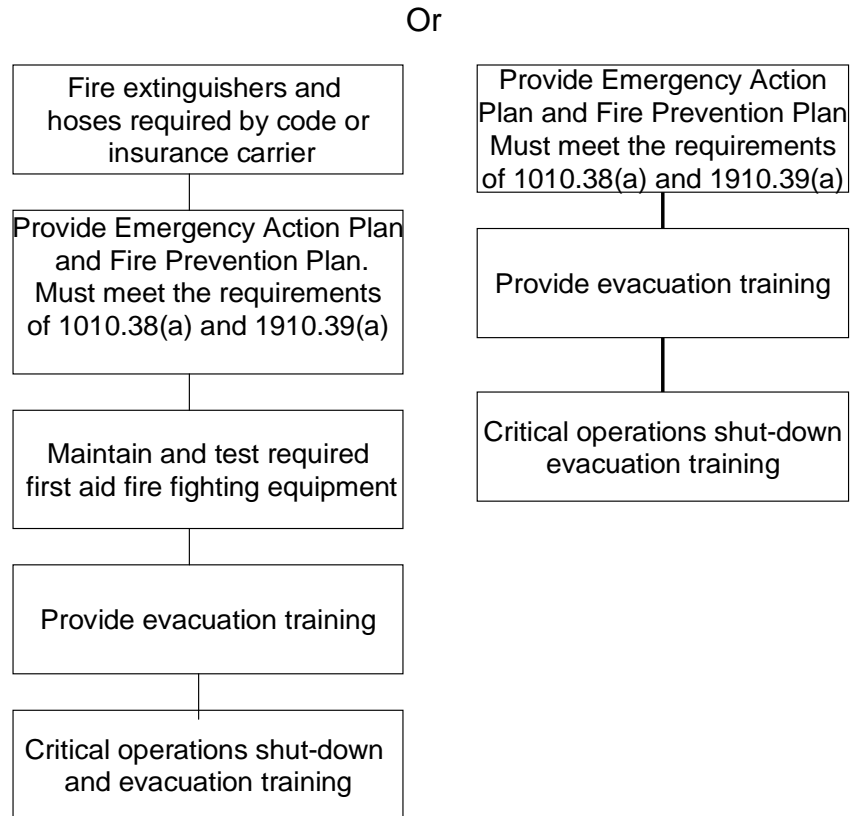


Figure 4

Option 2: Will Not Fight Fires



1910.155 SCOPE, APPLICATION AND DEFINITIONS APPLICABLE TO THIS SUBPART.

(a) Scope. This subpart contains requirements for fire brigades, all portable and fixed fire suppression equipment, fire detection systems, and fire or employee alarm systems installed to meet the fire protection requirements of 29 CFR Part 1910.

(b) Application. This subpart applies to all employments except for maritime, construction, and agriculture.

(c) Definitions applicable to this subpart.

(1). After-flame means the time a test specimen continues to flame after the flame source has been removed.

(2). Aqueous film forming foam (AFFF) means a fluorinated surfactant with a foam stabilizer which is diluted with water to act as a temporary barrier to exclude air from mixing with the fuel vapor by developing an aqueous film on the fuel surface of some hydrocarbons which is capable of suppressing the generation of fuel vapors.

(3). Approved means acceptable to the Assistant Secretary under the following criteria:

(i) If it is accepted, or certified, or listed, or labeled or otherwise determined to be safe by a nationally recognized testing laboratory; or

(ii) With respect to an installation or equipment of a kind which no nationally recognized testing laboratory accepts, certifies, lists, labels, or determines to be safe, if it is inspected or tested by another Federal agency and found in compliance with the provisions of the applicable National Fire Protection Association Fire Code; or

(iii) With respect to custom-made equipment or related installations which are designed, fabricated for, and intended for use by its manufacturer on the basis of test data which the employer keeps and makes available for inspection to the Assistant Secretary.

(iv) For the purposes of paragraph (c)(3) of this section:

(A) Equipment is listed if it is of a kind mentioned in a list which is published by a nationally recognized testing laboratory which makes periodic inspections of the production of such equipment and which states that such equipment meets nationally recognized standards or has been tested and found safe for use in a specified manner;

(B) Equipment is labeled if there is attached to it a label, symbol, or other identifying mark of a nationally recognized testing laboratory which makes periodic inspections of the production of such equipment, and whose labeling indicates compliance with nationally recognized standards or tests to determine safe use in a specified manner;

(C) Equipment is accepted if it has been inspected and found by a nationally recognized testing laboratory to conform to specified plans or to procedures of applicable codes; and

(D) Equipment is certified if it has been tested and found by a nationally recognized testing laboratory to meet nationally recognized standards or to be safe for use in a specified manner or is of a kind whose production is periodically inspected by a nationally recognized testing laboratory, and if it bears a label, tag, or other record of certification.

(E) Refer to §1910.7 for definition of nationally recognized testing laboratory.

(4). Assistant Secretary means the Assistant Secretary of Labor for Occupational Safety and Health or designee.

(5). Automatic fire detection device means a device designed to automatically detect the presence of fire by heat, flame, light, smoke or other products of combustion.

(6). “Buddy-breathing device” means an accessory to self-contained breathing apparatus which permits a second person to share the same air supply as that of the wearer of the apparatus.

(7). Carbon dioxide means a colorless, odorless, electrically nonconductive inert gas (chemical formula CO₂) that is a medium for extinguishing fires by reducing the concentration of oxygen or fuel vapor in the air to the point where combustion is impossible.

(8). Class A fire means a fire involving ordinary combustible materials such as paper, wood, cloth, and some rubber and plastic materials.

(9). Class B fire means a fire involving flammable or combustible liquids, flammable gases, greases and similar materials, and some rubber and plastic materials.

(10). Class C fire means a fire involving energized electrical equipment where safety to the employee requires the use of electrically nonconductive extinguishing media.

- (11). **Class D fire** means a fire involving combustible metals such as magnesium, titanium, zirconium, sodium, lithium and potassium.
- (12). **Dry chemical** means an extinguishing agent composed of very small particles of chemicals such as, but not limited to, sodium bicarbonate, potassium bicarbonate, urea-based potassium bicarbonate, potassium chloride, or monoammonium phosphate supplemented by special treatment to provide resistance to packing and moisture absorption (caking) as well as to provide proper flow capabilities. Dry chemical does not include dry powders.
- (13). **Dry powder** means a compound used to extinguish or control Class D fires.
- (14). **Education** means the process of imparting knowledge or skill through systematic instruction. It does not require formal classroom instruction.
- (15). **Enclosed structure** means a structure with a roof or ceiling and at least two walls which may present fire hazards to employees, such as accumulations of smoke, toxic gases and heat, similar to those found in buildings.
- (16). **Extinguisher classification** means the letter classification given an extinguisher to designate the class or classes of fire on which an extinguisher will be effective.
- (17). **Extinguisher rating** means the numerical rating given to an extinguisher which indicates the extinguishing potential of the unit based on standardized tests developed by Underwriters' Laboratories, Inc.
- (18). **Fire brigade** (private fire department, industrial fire department) means an organized group of employees who are knowledgeable, trained, and skilled in at least basic fire fighting operations.
- (19). **Fixed extinguishing system** means a permanently installed system that either extinguishes or controls a fire at the location of the system.
- (20). **Flame resistance** is the property of materials, or combinations of component materials, to retard ignition and restrict the spread of flame.
- (21). **Foam** means a stable aggregation of small bubbles which flow freely over a burning liquid surface and form a coherent blanket which seals combustible vapors and thereby extinguishes the fire.
- (22). **Gaseous agent** is a fire extinguishing agent which is in the gaseous state at normal room temperature and pressure. It has low viscosity, can expand or contract with changes in pressure and temperature, and has the

ability to diffuse readily and to distribute itself uniformly throughout an enclosure.

(23). Halon 1211” means a colorless, faintly sweet smelling, electrically nonconductive liquefied gas (chemical formula CBrClF_2) which is a medium for extinguishing fires by inhibiting the chemical chain reaction of fuel and oxygen. It is also known as bromo-chlorodifluoromethane.

(24). Halon 1301” means a colorless, odorless, electrically nonconductive gas (chemical formula CBrF_3) which is a medium for extinguishing fires by inhibiting the chemical chain reaction of fuel and oxygen. It is also known as bromotrifluoromethane.

(25). Helmet is a head protective device consisting of a rigid shell, energy absorption system, and chin strap intended to be worn to provide protection for the head or portions thereof, against impact, flying or falling objects, electric shock, penetration, heat and flame.

(26). Incipient stage fire means a fire which is in the initial or beginning stage and which can be controlled or extinguished by portable fire extinguishers, Class II standpipe or small hose systems without the need for protective clothing or breathing apparatus.

(27). Inspection means a visual check of fire protection systems and equipment to ensure that they are in place, charged, and ready for use in the event of a fire.

(28). Interior structural fire fighting means the physical activity of fire suppression, rescue or both, inside of buildings or enclosed structures which are involved in a fire situation beyond the incipient stage.

(29). Lining means a material permanently attached to the inside of the outer shell of a garment for the purpose of thermal protection and padding.

(30). Local application system means a fixed fire suppression system which has a supply of extinguishing agent, with nozzles arranged to automatically discharge extinguishing agent directly on the burning material to extinguish or control a fire.

(31). Maintenance means the performance of services on fire protection equipment and systems to assure that they will perform as expected in the event of a fire. Maintenance differs from inspection in that maintenance requires the checking of internal fittings, devices and agent supplies.

(32). Multipurpose dry chemical means a dry chemical which is approved for use on Class A, Class B and Class C fires.

(33). Outer shell is the exterior layer of material on the fire coat and protective trousers which forms the outermost barrier between the fire fighter and the environment. It is attached to the vapor barrier and liner and is usually constructed with a storm flap, suitable closures, and pockets.

(34). Positive-pressure breathing apparatus means self-contained breathing apparatus in which the pressure in the breathing zone is positive in relation to the immediate environment during inhalation and exhalation.

(35). Pre-discharge employee alarm means an alarm which will sound at a set time prior to actual discharge of an extinguishing system so that employees may evacuate the discharge area prior to system discharge.

(36). Quick disconnect valve means a device which starts the flow of air by inserting of the hose (which leads from the face piece) into the regulator of self contained breathing apparatus, and stops the flow of air by disconnection of the hose from the regulator.

(37). Sprinkler alarm means an approved device installed so that any water-flow from a sprinkler system equal to or greater than that from single automatic sprinkler will result in an audible alarm signal on the premises.

(38). Sprinkler system means a system of piping designed in accordance with fire protection engineering standards and installed to control or extinguish fires. The system includes an adequate and reliable water supply, and a network of specially sized piping and sprinklers which are interconnected. The system also includes a control valve and a device for actuating an alarm when the system is in operation.

(39). Standpipe systems

(i). Class I standpipe system means a 2-1/2" (6.3 cm) hose connection for use by fire departments and those trained in handling heavy fire streams.

(ii). Class II standpipe system means a 1-1/2" (3.8 cm) hose system which provides a means for the control or extinguishment of incipient stage fires.

(iii). Class III standpipe system means a combined system of hose which is for the use of employees trained in the use of hose operations and which is capable of furnishing effective water discharge during the more advanced stages of fire (beyond the incipient stage) in the interior of workplaces. Hose outlets are available for both 1-1/2" (3.8 cm) and 2-1/2" (6.3 cm) hose.

(iv). Small hose system means a system of hose ranging in diameter from 5/8" (1.6 cm) up to 1-1/2" (3.8 cm) which is for the use of employees and

which provides a means for the control and extinguishment of incipient stage fires.

(40). Total flooding system means a fixed suppression system which is arranged to automatically discharge a predetermined concentration of agent into an enclosed space for the purpose of fire extinguishment or control.

(41). Training means the process of making proficient through instruction and hands-on practice in the operation of equipment, including respiratory protection equipment, that is expected to be used and in the performance of assigned duties.

(42). Vapor barrier means that material used to prevent or substantially inhibit the transfer of water, corrosive liquids and steam or other hot vapors from the outside of a garment to the wearer's body.

1910.156 - FIRE BRIGADES

DEFINITIONS

Fire Brigade Organizational Statement -A written statement that identifies the scope of the fire brigade, organizational structure, training requirements, brigade size, and functions of the brigade members.

Incipient Stage Fire Brigade -An organized group of employees who are knowledgeable, trained and skilled in at least basic fire fighting operations and who collectively respond to any location to fight a fire in the initial stage which can be controlled or extinguished by Class II standpipe hose systems (1 1/2 inch) or portable fire extinguishers without the need for protective clothing or breathing apparatus.

Interior Structural Fire Brigade -An organized group of employees who are knowledgeable, trained and skilled in at least basic fire fighting operations and who collectively respond to any location to fight a fire and perform rescue operations inside building or enclosed structures where a fire has gone beyond the incipient stage, and requires protective clothing and breathing apparatus.

Personal Protective Clothing -Clothing and equipment such as coat, boots, pants, helmet, gloves and breathing apparatus that shield the body from heat, smoke, fumes, and other harmful conditions.

Pre-fire Planning -The act of preparing to fight a fire in a particular building or group of buildings by advance planning of possible fire fighting operation. It is suggested that pre-fire planning be conducted by the local fire department considering the workplace and process hazards. Involvement with the local fire department or fire prevention bureau is encouraged to facilitate coordination and cooperation between members of the fire brigade and those who might be called upon for assistance during the fire emergency.

GENERAL REQUIREMENTS

1910.156(a) This section contains requirements for the organization, training, and personal protective equipment of fire brigades. This section does not require an employer to organize a fire brigade. However, if an employer does decide to organize a fire brigade, the requirements of this section apply. The requirements of this section apply to fire brigades, industrial fire departments and private or contractual type fire departments. **The requirements of this section do not apply to airport crash rescue, forest fire fighting operations and volunteer fire departments.**

1910.156(b)(1) Organizational Statement. The organizational structure of a fire brigade must be designed to handle all plant emergencies. The number of members, scope of responsibility, plant physical characteristics, and specific hazards will determine how the fire brigade will be organized. In addition to the information required in paragraph .156(b)(1), it is suggested that the organizational statement also contain the following information:

- (1) A description of the duties that the fire brigade member are expected to perform;
- (2) the line authority of each fire brigade officer;
- (3) the number of fire brigade officers and numbers of fire brigade instructors, and;
- (4) a list of the types of awards and recognition that brigade members may be eligible to receive.

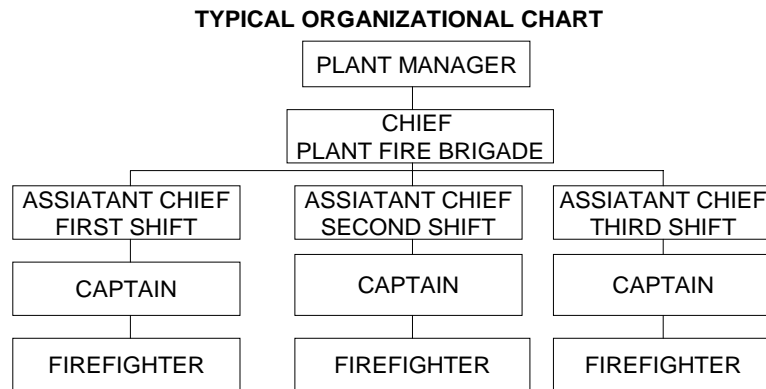
The organizational statement shall be available for inspection by the Secretary of Labor and by employees or their designated representatives.

The way an employer will organize employees for fire fighting will depend on many variables such as the availability and skill of outside help (local fire department), the proximity of the local fire department, the existing and potential dangers to personnel and

property, the frequency of plant emergencies, the availability of qualified personnel to train and participate in the plant's emergency organization, as well as other factors that will be unique to each plant.

REQUIRMENTS FOR THE ORGANIZATIONAL STATEMENT

- (1) The employer shall prepare and maintain a written policy which establishes the existence of a fire brigade.
- (2) The basic organizational structure.



- (3) The type, amount, and frequency of training to be provided to fire brigade members.
- (4) The expected number of members in the fire brigade.
- (5) The functions that the fire brigade is to perform at the workplace.

REQUIREMENTS FOR INCIPIENT STAGE FIRE BRIGADE

- (1) Provide a fire brigade organizational statement.
- (2) Provide (organizational statement) duty training.
- (3) Provide training and education in special hazards.
- (4) Provide instructors with higher level training.
- (5) Provide hands on training for Class II hose lines, portable fire extinguishers, and small hose lines **annually**.

REQUIREMENTS FOR INTERIOR STRUCTURAL FIRE BRIGADES

- (1) Provide a fire brigade organizational statement.
- (2) Assure member physical capability.
- (3) Provide special hazard training.
- (4) Provide instructors with higher level training.
- (5) Provide personal protective equipment.
- (6) Provide the training for duties in the fire brigade organizational statement.
- (7) Provide education **at least annually**.
- (8) Provide hands-on training **at least annually**.

ADVISORY: Fire brigade members should be adequately trained in the rendering of CPR, first aid and bloodborne pathogens.

1910.156(b)(2) Personnel. The employer shall assure that employees who are expected to do interior structural fire fighting are physically capable of performing duties that may be assigned to them during emergencies. The employer shall not permit employees with known heart disease, epilepsy, or emphysema, to participate in fire brigade emergency activities unless a physician's certificate of the employees' fitness to participate in such activities is provided. For employees assigned to fire brigades before September 15, 1980, this paragraph is effective on September 15, 1990. For employees assigned to fire brigades on or after September 15, 1980, this paragraph is effective December 15, 1980.

The physical fitness requirement applies only to those fire brigade members who perform interior structural fire fighting. Employees who cannot meet the physical capability requirement may still be members of the fire brigade so long as such employees do not perform interior structural fire fighting. It is suggested that fire brigade

members who are unable to perform interior structural fire fighting be assigned to less stressful and physically demanding fire brigade duties, e.g., certain types of training, recordkeeping, fire prevention inspection and maintenance, and fire pump operations.

Physically capable can be defined as being able to perform those duties specified in the training requirements of section 1910.156(c). Physically capable can also be determined by physical performance tests or by a physical examination when the examining physician is aware of the duties that the fire brigade member is expected to perform,.

It is also recommended that fire brigade members participate in a physical fitness program. There are many benefits which can be attributed to being physically fit. It is believed that physical fitness may help reduce the number of strain and sprain injuries as well as contributing to the improvement of the cardiovascular system.

1910.156(c)(1) Education and Training. The employer shall provide training and education for all fire brigade members commensurate with those duties and functions that fire brigade members are expected to perform. Such training and education shall be provided to fire brigade members before they perform fire brigade emergency activities. Fire brigade leaders and training instructors shall be provided with training and education which is **more comprehensive** than that provided to the general membership of the fire brigade.

The following recommendations should not be considered to be all of the necessary elements of a complete comprehensive training program, but the information may be helpful as a guide in developing a fire brigade training program.

All fire brigade members should be familiar with exit facilities and their location, emergency escape routes for handicapped workers, and the workplace “emergency action plan”.

In addition, fire brigade members who are expected to control and extinguish fires in the incipient stage should be, at a minimum, trained in the use of fire extinguishers, standpipes and other fire equipment they are assigned to use. They should also be aware of first aid medical procedures and procedures dealing with special hazards to which they may be exposed.

In addition to the above training, fire brigade members who are expected to perform emergency rescue and interior structural fire fighting should, at a minimum be familiar with proper techniques in rescue and fire suppression procedures. Training and education should include fire protection classes, classroom training, simulated fire situations including “wet drills” and, when feasible, extinguishment of actual mock fires. Frequency of training or education must be at least quarterly, but some drills or classroom training should be conducted as often as monthly or even weekly to maintain the proficiency of fire brigade members.

1910.156(c)(2) The employer shall assure that training and education is conducted frequently enough to assure that each member of the fire brigade is able to perform the member's assigned duties and functions satisfactorily and in a safe manner so as not to endanger fire brigade members or other employees. All fire brigade members shall be provided with training at least annually. In addition, fire brigade members who are expected to perform interior structural fire fighting shall be provided with an education session or training at least quarterly.

1910.156(c)(4) The employer shall inform fire brigade members about special hazards such as storage and use of flammable liquids and gases, toxic chemicals, radioactive sources, and water reactive substances, to which they may be exposed during fire and other emergencies. The fire brigade members shall also be advised of any changes that occur in relation to the special hazards. The employer shall develop and make available for inspection by fire brigade members, written procedures that describe the actions to be taken in situations involving the special hazards and shall include these in the training and education program.

It is also important that fire brigade members be informed about special hazards to which they may be exposed during fires and other emergencies. Such hazards as storage and use of flammable liquids and gases, toxic chemicals, water-reactive substances, etc., can pose difficult problems. There must be written procedures developed that describe the actions to be taken in situations involving special hazards. Fire brigade members must be trained in handling these special hazards as well as keeping abreast of any changes that may occur in relation to these special hazards.

1910.156(d) Fire fighting equipment. The employer shall maintain and inspect, at least annually, fire fighting equipment to assure the safe operational condition of the equipment. Portable fire extinguishers and respirators shall be inspected at least monthly. Fire fighting equipment that is in damaged or unserviceable condition shall be removed from service and replaced.

1910.156(e) Protective clothing. The following requirements apply to those employees who perform interior structural fire fighting. The requirements do not apply to employees who use fire extinguishers or standpipe systems to control or extinguish fires only in the incipient stage.

1910.156(e)(1)(i) The employer shall provide at no cost to the employee and assure the use of protective clothing which complies with the requirements of this paragraph. The employer shall assure that protective clothing ordered or purchased after July 1, 1981, meets the requirements contained in this paragraph. As the new equipment is provided, the employer shall assure that all fire brigade members wear the equipment when performing interior structural fire fighting. After July 1, 1985, the employer shall assure that all fire brigade members wear protective clothing meeting the requirements of this paragraph when performing interior structural fire fighting.

1910.156(e)(1)(ii) The employer shall assure that protective clothing protects the head, body, and extremities, and consists of at least the following components: foot and leg protection; hand protection; body protection; eye, face and head protection.

ADVISORY: For more detailed information on protective clothing requirements for fire brigade members, see #7 “Protective clothing” of Appendix A to Subpart L to 1910 – Fire Protection.

1910.156(f)(1)(i) Respiratory protection devices. The employer shall provide at no cost to the employee and assure the use of respirators which comply with the requirements of this paragraph. The employer shall assure that respiratory protection devices worn by fire brigade members meet the requirements of 29 CFR 1910.134 and the requirements contained in this paragraph and are certified under 30 CFR Part II.

1910.156(f)(1)(ii) Approved self-contained breathing apparatus with full-face piece, or with approved helmet or hood configuration, shall be provided to and worn by fire brigade members while working inside buildings or confined spaces where toxic products of combustion or an oxygen

deficiency may be present. Such apparatus shall also be worn during emergency situations involving toxic substances.

1910.156(f)(1)(iii) Approved self-contained breathing apparatus may be equipped with either a “buddy breathing” device or a quick disconnect valve, even if devices are not certified by NIOSH. If these accessories are used, they shall not cause damage to the apparatus, or restrict the air flow of the apparatus, or obstruct the normal operation of the apparatus.

1910.156(f)(1)(iv) Approved self-contained compressed air breathing apparatus may be used with approved cylinders from other approved self-contained compressed air breathing apparatus provided that such cylinders are of the same capacity and pressure rating. All compressed air cylinders used with self-contained breathing apparatus shall meet DOT and NIOSH criteria.

1910.156(f)(1)(v) Self-contained breathing apparatus shall have a minimum service life rating of 30 minutes in accordance with the methods specified by NIOSH except for escape self-contained breathing apparatus (ESCBAs) used only for emergency escape purposes.

1910.156(f)(1)(vi) Self-contained breathing apparatus shall be provided with an indicator which automatically sounds an audible alarm when the remaining service life of the apparatus is reduced to within a range of 20 to 25 percent of its rated service time..

1910.156(f)(2)(i) The employer shall assure that self-contained breathing apparatus ordered or purchased after July 1, 1981, for use by fire brigade members performing interior structural fire fighting operations, are of the pressure-demand or other positive-pressure type. Effective July 1, 1983, only pressure-demand or other positive-pressure self-contained breathing apparatus shall be worn by fire brigade members performing interior structural fire fighting.

ADVISORY: For detailed information on the requirements for respiratory protective devices of fire brigade members, see #8 “Respiratory protective devices” of Appendix A to Subpart L to 1910 – Fire Protection.

ADVISORY: If your company performs interior structural firefighting, all fire fighters must comply with 29 CFR 1910.134 respiratory protection regarding IDLH Atmospheres, and 2-in, 2-out procedures (procedures for interior structural fire fighting).

1910.157 – Portable Fire Extinguishers

DEFINITIONS

Approved- acceptable to the Secretary of Labor under the following conditions:

- (a) If it is accepted, or certified, or listed, or labeled or otherwise determined to be safe by a nationally recognized testing laboratory, such as, but not limited to, Underwriters' Laboratories, Inc. or the Factory Mutual System; or
- (b) With respect to an installation of equipment of a kind which no nationally recognized testing laboratory accepts, certifies, lists, labels, or determines to be safe, if it is inspected or tested by another Federal/State agency and found in compliance with the provisions of applicable National Fire Protection Association Fire Code; or
- (c) With respect to custom-made equipment or related installations which are designed, fabricated for, and intended for use by the manufacturer on the basis of test data which the employer keeps and makes available for inspection to the Secretary of which the employer keeps and makes available for inspection to the Secretary of test data which the employer keeps and makes available for inspection to the Secretary of Labor.

Inspection –A visual check of the fire protection system and equipment to ensure that they are in place, charged, and ready for use in the event of a fire.

Extinguishers Classification -The letter classification given an extinguisher to designate the class or classes of fire on which an extinguisher will be effective.

Extinguisher Rating -The numerical rating given to an extinguisher which indicates the extinguishing potential of the unit based on standardized tests developed by Underwriters' Laboratories, Inc.

Education -The process of imparting knowledge or skill through systematic instruction.

Training -The process of making proficient through inspection and **hands-on practice** in the operation of equipment.

Designated Employee -A person selected to handle small fires **in their own immediate work area.**

Incipient Stage Fire -A fire which is in the initial or beginning stage and which can be controlled or extinguished by portable fire extinguishers, Class II standpipe or small hose system **without the need for protective clothing and breathing apparatus.**

This A-B-C extinguisher has a U.L. classification of 1A 10-B:C.



Parts of a stored pressure fire extinguisher



SCOPE & APPLICATION

The scope and application of this section is written to apply to three basic types of workplaces. First, there are those workplaces where the employer has chosen to evacuate all employees from the workplace at the time of a fire emergency. Second, there are those workplaces where the employer has chosen to permit certain employees to fight fires and to evacuate all other non-essential employees at the time of a fire emergency. Third, there are those workplaces where the employer has chosen to permit all employees in the workplace to use portable fire extinguishers to fight fires.

This section also addresses two kinds of work areas. The entire workplace can be divided into outside (exterior) work areas and inside (interior) work areas. This division of the workplace into two areas is done in recognition of the different types of hazards employees may be exposed to during fire fighting operations. Fires in interior workplaces, pose a greater hazard to employees; they can produce greater exposure to quantities of smoke, toxic gases, and heat because of the capability of a building or structure to contain or entrap these products of combustion until the building can be ventilated. Exterior work areas, normally open to the environment, are somewhat less hazardous, because the products of combustion are generally carried away by the thermal column of the fire. Employees also have a greater selection of evacuation routes if it is necessary to abandon fire fighting efforts.

In recognition of the degree of hazard present in the two types of work areas, the standards for exterior work areas are somewhat less restrictive in regards to extinguisher distribution. Paragraph (a) explains this by specifying which paragraphs in the section apply.

1910.157(a) The requirements of this section apply to the placement, use, maintenance, and testing of portable fire extinguishers provided for the use of employees. 1910.157(d) does not apply to extinguishers provided for employee use on the outside of workplace buildings or structures. Where extinguishers are provided but are not intended for employee use and the employer has an emergency action plan and a fire prevention plan which meet the requirements of 1910.38 and 1910.39, then only the requirements of 1910.157(e) and (f) apply.

ADVISORY: In recognition of the three options given to employers in regard to the amount of employee evacuation to be carried out, the standards permit certain exemptions based on the number of employees expected to use fire extinguishers.

Where the employer has chosen to totally evacuate the workplace at the time of a fire emergency and when fire extinguishers are not provided, the requirements of this section do not apply to that workplace.

Where the employer has chosen to partially evacuate the workplace or the affected area at the time of a fire emergency and has permitted certain designated employees to remain behind to operate critical plant operations or to fight fires with extinguishers, then the employer is exempt from the distribution requirements of this section. Employees who will be remaining behind to perform incipient fire fighting or members of a fire brigade must be trained in their duties. The training must result in the employees becoming familiar with the locations of fire extinguishers. Therefore, the employer must locate the extinguishers in convenient locations where the employees know they can be found.

For example, they could be mounted in the fire truck or cart that the fire brigade uses when it responds to a fire emergency. They can also be distributed as set forth in the National Fire Protection Association's Standard No. 10 "Portable Fire Extinguishers."

Where the employer has decided to permit all employees in the workforce to use fire extinguishers, then the entire OSH standard, 1910.157, applies.

EXEMPTIONS

1910.157(b) (1) Where the employer has established and implemented a written fire safety policy which requires the immediate and total evacuation of employees from the workplace upon the sounding of a fire alarm signal and which includes an emergency plan and a fire prevention plan which meets the requirements of 1910.38, and when extinguishers are not available in the workplace, the employer is exempt from all requirements of this

section unless a specific standard in Part 1910 requires that a portable fire extinguisher be provided.

(2) Where the employer has an emergency action plan meeting the requirements of 1910.38 which designates certain employees to be the only employees authorized to use the available portable fire extinguishers, and which requires all other employees in the fire area to immediately evacuate the affected work area upon the sounding of the fire alarm, the employer is exempt from the distribution requirements in 1910.157 of this section.

GENERAL REQUIREMENTS

1910.157(c) (1) The employer shall provide portable fire extinguishers and shall mount, locate and identify them so that they are readily accessible to employees without subjecting the employees to possible injury.

It is the intent of OSH to permit the mounting of extinguishers in any location that is accessible to employees without the use of portable devices such as a ladder. This limitation is necessary because portable devices can be moved or taken from the place where they are needed and, therefore, might not be available at the time of an emergency.

Employers are given as much flexibility as possible to assure that employees can obtain extinguishers as fast as possible. For example, an acceptable method of mounting extinguishers in areas where fork lift trucks or tow-motors are used is to mount the units to retractable boards which, by means of counterweighting, can be raised above the level where they could be struck by vehicular traffic. When needed, they can be lowered quickly for use. This method of mounting can also reduce vandalism and unauthorized use of extinguishers. The extinguishers may also be mounted as outlined in the National Fire Protection Association's Standard #10, "Portable Fire Extinguishers."

(2) Only approved portable fire extinguishers shall be used to meet the requirements of this section.

(3) The employer **shall not** provide or make available in the workplace

portable fire extinguishers using carbon tetrachloride or chlorobromomethane extinguishing agents.

ADVISORY: Carbon tetrachloride releases a highly toxic gas when used on a fire.

(4) The employer shall assure that portable fire extinguishers are maintained in a fully charged and operable condition and kept in their designated places at all times except during use.

1910.157(c)(5) The employer shall permanently remove from service by January 1, 1982, all soldered or riveted shell self-generating soda acid or self-generating foam or gas cartridge water type portable fire extinguishers which are operated by inverting the extinguisher to rupture the cartridge or to initiate an uncontrollable pressure generating chemical reaction to expel the agent.

SELECTION & DISTRIBUTION

1910.157(d)(1) Portable fire extinguishers shall be provided for employee use and selected and distributed based on the classes of anticipated workplace fires and on the size and degree of hazard which would affect their use.

ADVISORY: The employer is responsible for the proper selection and distribution of fire extinguishers and the determination of the necessary degree of protection. The selection and distribution of fire extinguishers must reflect the type and class of fire hazards associated with a particular workplace.

Different types of fire extinguishers are designed to extinguish fires involving different types of fuel. Extinguishers are classified as A, B, C, D or K (or a combination) depending on the fire against which their agents are effective.

"Class A fire" means a fire involving ordinary combustible materials such as paper, wood, cloth, and some rubber and plastic materials.

"Class B fire" means a fire involving flammable or combustible liquids, flammable gases, greases and similar materials, and some rubber and plastic materials.

"Class C fire" means a fire involving energized electrical equipment where safety to the employee requires the use of electrically nonconductive extinguishing media.

"Class D fire" means a fire involving combustible metals such as magnesium, titanium, zirconium, sodium, lithium, and potassium.

"Class K fires" means a fire involving cooking media (grease, fat and oils) in commercial appliances.

ADVISORY: The effectiveness of an extinguisher on a particular fire depends on the amount and type of agent in the extinguisher. Different extinguishing agents can be used to put out a certain class of fire by one or more methods: removing oxygen, heat, fuel, and interrupting the chemical chain reaction. Some extinguishing agents may be able to extinguish more than one class of fire. They are marked with multiple letters (A, B, C) or symbols and number rating.

The following are the most common extinguishing agents, the classes of fire they are used against, and the extinguishing methods they use:

Water -Used only on Class A fires. Water is most effective in cooling the burning material below its ignition temperature. Under certain conditions, the steam converted from the water will exclude oxygen and smother the fire.

Foam -Used only on Class A and B fires. Foam removes fuel by forming a layer over a burning liquid and preventing flammable vapors from escaping. Foam will also smother by keeping oxygen from mixing with the vapors and cool with a constant layer of water-bearing foam.

Dry Chemicals -There are two basic types of dry chemical extinguishing agents: regular or ordinary dry chemicals used only on Class B or C fires, and multi-purpose dry chemicals used on Class A, B, and C fires. Dry chemical agents inhibit the chain reaction and, to a

certain degree, cool and smother the fire.

Carbon Dioxide (CO₂) - Used on Class B and C fires. CO₂ extinguishes fire by smothering, reducing the oxygen level below that which supports combustion. Under certain conditions, the cooling effect of the gas (-110°F) also helps put out the fire.

Halon -Used on Class B and C fires. These liquefied gases are most effective in interrupting the chain reaction, but they also have slight smothering and cooling effects. Bromotrifluoromethane, also known as Halon 1301, is an example. Halon production was halted on December 31, 1993 for the reason that it depletes the stratospheric ozone.

Clean agents/Halon replacements- Used on A, B, and C fires depending on the size of the extinguisher. Clean agents gases are most effective in interrupting the chain reaction of a fire.

Extinguishers for protecting Class A hazards may be selected from the following types: water, foam, loaded stream, multipurpose dry chemical or clean agents. Extinguishers for protecting Class B hazards may be selected from the following types: carbon dioxide, dry chemicals, foam, loaded stream or clean agents. Extinguishers for protecting Class C hazards may be selected from the following types: carbon dioxide, dry chemical or clean agents. The extinguishing agents for Class D fires can vary depending upon the type of metal. However, there are “universal” type agents which can be used on a variety of combustible metal fires if necessary. The “universal” type agents include: Foundry flux, Lith-X powder, TMB liquid, pyromet powder, TEC powder, dry talc, dry graphite powder, dry sand, dry sodium chloride, dry soda ash, lithium chloride, zirconium silicate, and dry dolomite.

1910.157(d) (2) The employer shall distribute portable fire extinguishers for use by employees on Class A fires so that the travel distance for employees to any extinguishers is never more than 75 feet (22.9 m).

1910.157(d) (3) The employer may use uniformly spaced standpipe systems or hose stations connected to a sprinkler system installed for emergency use by employees instead of **Class A** portable fire extinguishers, provided that such systems meet the respective requirements of 1910.158 or 1910.159, that they provide total coverage of the area to be protected, and that employees

are trained at least annually in their use.

1910.157(d) (4) The employer shall distribute portable fire extinguishers for use by employees on **Class B** fires so that the travel distance from the Class B hazard area to any extinguisher is never more than **50 feet** (15.2 m).

1910.157(d) (5) The employer shall distribute portable fire extinguishers used for **Class C** hazards on the basis of the appropriate pattern for the existing Class A or Class B hazards.

1910.157(d) (6) The employer shall distribute portable fire extinguishers or other containers of **Class D** extinguishing agent for use by employees so that the travel distance from the combustible metal working area to any extinguishing agent is never more than **75 feet** (22.9 m). Portable fire extinguishers for Class D hazards are required in those combustible metal working areas where combustible metal powders, flakes, shavings, or similarly sized products are generated at least once every two weeks.

ADVISORY: The employer is permitted to substitute acceptable standpipe systems for portable fire extinguishers under certain circumstances. It is necessary to assure that any substitution will provide the same coverage that portable units provide. This means that fire hoses, because of their limited portability, must be spaced throughout the protected area so that they can reach around obstructions such as columns, machinery, etc. and so that they can reach into closets and other enclosed areas.

INSPECTION, MAINTENANCE & TESTING

1910.157(e) (1) The employer shall be responsible for the maintenance and testing of all portable fire extinguishers in the workplace.

1910.157(e) (2) Portable extinguishers (or hose used in lieu thereof under 1910.157(d)(3) of this section) shall be visually inspected monthly.

1910.157(e) (3) The employer shall assure that portable fire extinguishers are subjected to an annual maintenance check. Stored pressure extinguishers do not require an internal examination. The employer shall record the annual maintenance date and retain this record for one year after the last entry or the

life of the shell, whichever is less. The record shall be available to the Assistant Secretary upon request.

1910.157(e)(4) The employer shall assure that stored pressure dry chemical extinguishers that require a 12-year hydrostatic test are emptied and subjected to applicable maintenance procedures every 6 years. Dry chemical extinguishers having non-refillable disposable containers are exempt from this requirement. When recharging or hydrostatic testing is performed, the 6-year requirement begins from that date.

TABLE L-1

Type of extinguishers	Test interval (years)
Soda acid (soldered brass shells) (until 1/1/82)	(1)
Soda acid (stainless steel shell)	(1)
Cartridge operated water and/or antifreeze	5
Stored pressure water and/or antifreeze	5
Wetting agent	5
Foam (soldered brass shells) (until 1/1/82)	(1)
Foam (stainless steel shell)	5
Aqueous Film Forming foam (AFFF)	5
Loaded stream	5
Dry chemical with stainless steel	5
Carbon Dioxide	5
Dry chemical, stored pressure, with mild steel, brazed brass or aluminum shells	12
Dry chemical, cartridge or cylinder operated, with mild steel shells	12
Halon 1211	12
Dry powder, cartridge or cylinder operated with mild steel shells	12
	12

¹Extinguishers having shells constructed of copper or brass joined by soft solder, rivets and all soda acid shall not be hydrostatically tested and shall be removed from service by January 1, 1982.

ADVISORY: The ultimate responsibility for the inspection, maintenance and testing of portable fire extinguishers lies with the employer. The actual inspection, maintenance, and testing required by these standards may, however, be conducted by properly qualified outside contractors with whom the employer has arranged to do the work. When contracting such work, the employer should assure that the contractor is capable of doing the work that is needed to comply with this standard.

The employer should establish a program for the periodic inspection of each extinguisher and as well as effective fire extinguisher maintenance and testing. Before setting up a program, the employer should obtain guidelines on inspection, maintenance, and testing. Most employers have inspections performed by their own employees who have been trained for this task.

The following items should be included part of a periodic inspection:

- (1) Accessibility & location;
- (2) Tag or record for date of last recharge or inspection;
- (3) Check nozzle for obstructions and operation;
- (4) Corrosion or mechanical damage;
- (5) Safety pin and seal;
- (6) Determine of full by pressure gauge or weight (by type);
- (7) Condition of hose and hose coupling, and;
- (8) Check horn for cracks, dirt or grease accumulation.
- (9)

ADVISORY: Some form of written verification of periodic inspection of each extinguisher is required, whether it be filling out the back of the maintenance tag, a printed monthly checklist or the use scanned barcodes on individual extinguishers.

With the exception of very large companies, extinguisher maintenance is most often performed by extinguisher service companies with specially trained technicians.

ADVISORY: A fire extinguisher maintenance program should include the purchase and maintenance dates of all extinguishers. These dates may be on the extinguisher, but a separate record (log) can also be used as long as it includes the following information:

- (1) The maintenance date and name of the person or agency performing the maintenance;
- (2) The date when last recharged and the name of the person or agency performing recharge, and;
- (3) The date when last hydrostatic test conducted and the name of the person performing the test.

If a log is used, a serial number or some other of permanent means of traceability for each individual extinguisher is needed.

Hydrostatic testing can be a very dangerous process and should be left to contractors or individuals using suitable facilities and having the training necessary to perform the work. Employers are encouraged to use contractors who can perform adequate and reliable service. Firms which have been certified by the Materials Transportation Board (MTB) of the U.S. Department of Transportation (DOT) or State licensed extinguisher servicing firms or those firms recognized by the National Association of Fire Equipment Distributors in Chicago, Illinois, are generally acceptable for performing this service.

If the employer should elect to perform any of the maintenance, and testing requirements of this section on an in-house basis, then the employer must ensure that the work is performed only by competent persons who have been properly trained and can recognize problem areas which could cause an extinguisher to be inoperable. The National Fire Protection Association provides excellent **advisory** guidelines in its standard for portable fire extinguishers. The employer may also check with the manufacturer of the purchased unit for inspection and maintenance instructions of that specific extinguisher.

Anytime the employer has removed an extinguisher from service to be checked or repaired, alternate equivalent protection must be provided. Alternate equivalent protection could include replacing the extinguisher with one or more units having equivalent or equal ratings, posting a fire watch, restricting the unprotected area from employee exposure, or providing a hose system ready to operate.

TRAINING & EDUCATION

1910.157(g) (1) Where the employer has provided portable fire extinguishers for employee use in the workplace, the employer shall also provide an educational program to familiarize employees with the general principles of fire extinguisher use and the hazards involved with incipient stage fire fighting.

In meeting the requirements of this section, the employer may also provide educational materials, without classroom instruction, through the use of employee notice campaigns using instruction sheets or flyers of similar types of informal programs.

ADVISORY: If an employer expects an employee to fight an incipient stage fire in *their* immediate work area, those employees are theoretically designated and should comply with 1910.157(g)(3) & (4).

(2) The employer shall provide the education required in paragraph (g)(1) of this section upon initial employment and at least annually thereafter.

(3) The employer shall provide employees who have been designated to use fire fighting equipment as part of an emergency action plan with training in the use of the appropriate equipment.

This part of the standard is of the utmost importance to employers and employees because of the risk of injury or death due to use of an extinguisher or firefighting equipment. If an employer is going to permit an employee to fight a workplace fire of any size, the employer must make sure that the employee knows everything necessary to assure the employee's safety.

(4) The employer shall provide the training required in paragraph (g)(3) of this section upon initial assignment to the designated group of employees and at least annually thereafter.

ADVISORY: Portable fire extinguishers offer the best protection for immediately controlling of incipient stage fires in the workplace. Their portability and ease of operation make them ready for use within seconds in case of a fire. Training and education is required and helps in proper use of the extinguisher. Employees should know how to identify extinguishers, types that are available, where they are located in the workplace, and how to use them properly.

Portable fire extinguishers come in many shapes, sizes, and types. Employers should choose the right size and type to meet their needs, based on the hazards present. Regardless of the manufacturer, the

methods of operation of extinguishers are basically the same. The instructions are on the nameplate of the extinguisher. However, every employee should be familiar with the following general instructions which apply to most fire extinguishers, and with the more specific instructions of each type.

ADVISORY: Employees should be familiar with classes of fires and extinguishers. For example, an employee would *not* use a Class "A" portable fire extinguisher on a Class "C" fire, unless the extinguishers had an A-B-C rating.

Operation of Hand-Held Portable Fire Extinguishers

Most portable fire extinguishers are designed to be carried and used in an upright position. Before using the extinguisher, an employee should be close enough for the agent of the extinguisher to reach the fire.

There are **four basic steps** for using most hand-held portable fire extinguishers:

- (1) **Pull the pin** (breaking the seal) at the top of the extinguisher.
- (2) **Point the nozzle** or outlet toward the base of the fire. If the hose or horn is clipped to the body of the extinguisher, be sure to unclip it first.
- (3) **Press the handle** above the carrying handle to discharge the agent. Release the handle to stop agent from being discharged.
- (4) **Sweep the hose** or nozzle back and forth to spread agent on the fire. Direct agent to the base of the flames.

Make sure the fire is out by probing the smoldering spots or liquids that could re-flash, before leaving area. When leaving the area, **DO NOT TURN YOUR BACK** towards the extinguished fire; back away towards your exit route.

An initial plan should be a part of education and training, including replacement and recharging of portable fire extinguishers after use. This plan may include emergency evacuation of other work areas.

ADVISORY: In the event of a fire, regardless of size, management and the proper authorities (local fire service) should be notified in conjunction with fire fighting activities.

Training and education can be obtained through many channels. Often, local fire departments in larger cities have fire prevention bureaus or similar organizations which can provide basic fire prevention training programs. Fire insurance companies will have data and information available. The National Fire Protection Association and the National Safety Council will provide, at a small cost, publications that can be used in a fire prevention program.

Actual fire fighting training can be obtained from various sources in the country. The Texas A&M University, the University of Maryland's Fire and Rescue Institute, West Virginia University's Fire Service Extension, Iowa State University's Fire Service Extension and other State training schools and land grant colleges have fire fighting programs directed to industrial applications. Some manufacturers of extinguishers, such as the Ansul Company and Safety First, conduct fire schools for customers in the proper use of extinguishers. Several large corporations have taken time to develop their own on-site training programs which expose employees to the actual "feeling" of fire fighting. Simulated fires for training of employees in the proper use of extinguishers are also an acceptable part of a training program.

When extinguishers are provided and intended for employee use and the employer does not have an emergency action plan, a fire prevention plan or a written fire safety policy, all employees must be educated with the general principles of fire extinguisher use and the hazards involved with incipient stage fire fighting. In addition, employees also must receive hands-on training with each type of portable fire extinguisher that is provided for their use.

1910.158 - STANDPIPE AND HOSE SYSTEMS

The purpose of standpipe systems is to provide hose connections inside a building. These connections may be in either a vertical or horizontal position and are usually located on each floor. They may also be located on roofs of buildings, in basements, or outside in open yard areas of large industrial plants. A standpipe system must be supplied with adequate water and pressure in order to be effective. Certain types of standpipes may be equipped with small fire hose and nozzles attached to the standpipe outlet for use by employees. Standpipe systems may be supplied by either a direct connection to the water supply, a fire department pumper, or both.

TYPES OF STANDPIPE SYSTEMS

There are several different types of standpipe systems. They include:

- (1) Wet standpipe systems that have the water supply valve open and water in the system at all times;
- (2) Dry standpipe systems that admit water to the system through the operation of a manually activated control valve;
- (3) Dry standpipe systems that admit water to the system automatically through the use of approved devices such as dry-pipe valves, and;
- (4) Dry standpipe systems that have no permanent water supply and must be supplied with water by the fire department.

STANDPIPE SYSTEM CLASSIFICATION

Class I Standpipe System - A 2 1/2" (6.3 cm) hose connection for use by fire departments and those trained in handling heavy fire streams.

Class II Standpipe System - A 1 1/2" (3.8 cm) hose system which provides a means for the control of extinguisher of incipient stage fires.

Class III Standpipe System - A combined system of hose which is

for the use of employees trained in the use of hose operation and which is capable of furnishing effective water discharge during the more advanced stages of fire (beyond the incipient stage) in the interior of workplaces. Hose outlets are available for both 1 1/2" (3.8 cm) and 2 1/2" (6.3 cm) hose.

Small Hose System - A system of hose ranging in diameter from 5/8" (1.6 cm) up to 1 1/2" (3.8 cm) which is for the use of employees and which provides a means for the control and extinguishment of incipient stage fires.

NOTE: Hose stations may also be attached to sprinkler systems. Refer to 1910.159(e)(5).

REQUIREMENTS

This section has been written to provide adequate coverage of those standpipe and hose systems that an employer may install in the workplace to meet the requirements of a particular OSH standard. For example, OSH permits the substitution of hose systems for portable fire extinguishers in 1910.157. If an employer chooses to provide hose systems instead of portable Class A fire extinguishers, then those hose systems used for substitution would have to meet the applicable requirements of 1910.157. All other standpipe and hose systems not used as a substitute would be exempt from these requirements.

The section specifically exempts Class I large hose systems. By large hose systems, OSH means those 2 1/2" hose lines that are usually associated with fire departments of that size that would provide their own water supply through fire apparatus. When the fire gets to the size that outside protection of that degree is necessary, KOSH believes that in most industries employees will have been evacuated from the fire area and the "professional" fire fighters will have control.

Protection of Standpipes

1910.158(b) The employer shall assure that standpipes are located or otherwise protected against mechanical damage. Damaged standpipes shall be repaired promptly.

Equipment

1910.158(c)(1) Where reels or cabinets are provided to contain fire hose, the employer shall assure that they are designed to facilitate prompt use of the hose valves, the hose, and other equipment at the time of a fire or other emergency. The employer shall assure that the reels and cabinets are conspicuously identified and used only for fire protection.

1910.158(c)(2)(i) The employer shall assure that hose outlets and connections are located high enough above the floor to avoid being obstructed and to be accessible to employees.

1910.158(c)(2)(ii) The employer shall standardize screw threads or provide appropriate adapters throughout the system and assure that the hose connections are compatible with those used on the supporting fire equipment.

The employer must assure that employees who use standpipe and hose systems can reach the hose rack and hose valve without the use of portable devices such as ladders. Hose reels are encouraged for use because one employee can retrieve the hose, charge the hose and place it into service without much difficulty.

1910.158(c)(3)(i) The employer shall assure that every 1 1/2" (3.8 cm) or smaller hose outlet used to meet this standard is equipped with hose connected and ready for use. In extremely cold climates where such installations may result in damaged equipment, the hose may be stored in another location provided it is readily available and can be connected when needed.

<p>ADVISORY: Hose length should be long enough to reach hazard(s) protected. NFPA Standard 14 indicates that hose should reach within 30 feet of protected hazard. This is not an OSH standard, but may be used as a guide.</p>
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1910.158(c)(3)(ii) Standpipe systems installed after January 1, 1981, for use by employees, shall be equipped with lined hose. Unlined hose may remain in use on existing systems. However, after the effective date of this standard, unlined hose which becomes unserviceable shall be replaced with lined hose.

ADVISORY: There is approved lined hose available that can be used to replace unlined hose which is stored on racks in cabinets. The lined hose is constructed so that it can be folded and placed in cabinets in the same manner as unlined hose.

1910.158(c)(3)(iii) The employer shall provide hose of such length that friction loss resulting from water flowing through the hose will not decrease the pressure at the nozzle below 30 psi (210 kPa). The dynamic pressure at the nozzle shall be within the range of 30 psi (210 kPa) to 125 psi (860 kPa).

ADVISORY: Hose is considered to be unserviceable when it deteriorates to the extent that it can no longer carry water at the required pressure and flow rates. Dry rotted linen or hemp hose, cross threaded couplings, and punctured hose are examples of unserviceable hose.

1910.158(c)(4) Nozzles. The employer shall assure that standpipe hose is equipped with shut-off type nozzles.



There are various types of lever action shut-off nozzles and twist shut-off nozzles

ADVISORY: Variable stream nozzles can provide useful variations in water flow and spray patterns during fire fighting operations and they are recommended for employee use. It is recommended that 100 psi nozzle pressure be used to provide good flow patterns for variable stream nozzles. The most desirable attribute for nozzles is the ability of the nozzle person to shut off the water flow at the nozzle when it is necessary. This can be accomplished in many ways. For example, a shut-off nozzle with a lever or rotation of the nozzle to stop flow

would be effective, but in other cases a simple globe valve placed between a straight stream nozzle and the hose could serve the same purpose. For straight stream nozzles 50 psi nozzle pressure is recommended. The intent of this standard is to protect the employee from "run-away" hoses if it becomes necessary to drop a pressurized hose line and retreat from the fire front and other related hazards.

1910.158(d) The minimum water supply for standpipe and hose systems, which are provided for the use of employees, shall be sufficient to provide **100 gallons per minute** (6.3 l/s) for a period of **at least 30 minutes**.

ADVISORY: The amount of water required for standpipe systems depends upon the size and number of fire streams that will be needed and probable length of time they will be used. Both of these factors are largely influenced by the construction and occupancy of the building or plant. When the character of the water supply must be studied and specific conditions such as acceptability, pumps, tanks, and sprinkler systems must be considered, NFPA 14, Standard for the Installation of Standpipe and Hose Systems, should be consulted.

To determine nozzle pressure, you must know the standpipe pressure. The pressure must be modified by (3) factors:

< Friction loss in hose.

< Friction loss in standpipe.

< Elevation loss or gain.

To insure adequate water supply and nozzle pressure, requires some basic knowledge of fire service hydraulics, and use of devices for measuring water pressure.

An engineer having obtained information from a flow test, and having at hand other necessary data with reference to elevations, length, and diameter of pipes (and, on occasion, information as to peculiarities of a given water supply system) may, by a few simple calculations, predict the amount of water that might be obtained at certain residual pressures at other locations, in a simple underground piping system.

Additional information and assistance on the subject can be obtained from various sources or by contacting the "Division of Education and

Training" listed on the back cover of this booklet.

Tests

1910.158(e)(1)(i) The employer shall assure that the piping of Class II and III systems installed after January 1, 1981, including yard piping, is hydrostatically tested for a period of **at least 2 hours at not less than 200 psi** (1380 kPa), or **at least 50 psi** (340 kPa) **in excess of normal pressure** when such pressure is greater than 150 psi (1030 kPa).

1910.158(e)(1)(ii) The employer shall assure that hose on all standpipe systems installed after January 1, 1981, is hydrostatically tested with couplings in place, at pressure of not less than 200 psi (1380 kPa), before it is placed in service. This pressure shall be maintained for at least 15 seconds and not more than one minute during which time the hose shall not leak nor shall any jacket thread break during the test.

Maintenance

1910.158(e)(2)(i) The employer shall assure that water supply tanks are kept filled to the proper level except during repairs. When pressure tanks are used, the employer shall assure that proper pressure is maintained at all times except during repairs.

1910.158(e)(2)(ii) The employer shall assure that valves in the main piping connections to the automatic sources of water supply are kept fully open at all times except during repair.

1910.158(e)(2)(iii) The employer shall assure that hose systems are inspected at least annually and after each use to assure that all of the equipment and hose are in place, available for use, and in serviceable condition.

1910.158(e)(2)(iv) When the system or any portion thereof is found not to be serviceable, the employer shall remove it from service immediately and replace it with equivalent protection such as extinguishers and fire watches.

1910.158(e)(2)(v) The employer shall assure that hemp or linen hose on existing systems is unracked, physically inspected for deterioration, and

re-racked using a different fold pattern at **least annually**. The employer shall assure that defective hose is replaced in accordance with paragraph (c)(3)(ii).

1910.158(e)(2)(vi) The employer shall designate trained persons to conduct all inspections required under this section.

1910.159 - AUTOMATIC SPRINKLER SYSTEMS

DEFINITIONS

Sprinkler System -A system of piping designed in accordance with fire protection engineering standards and installed to control or extinguish fires. The system includes an adequate and reliable water supply, and a network of specially sized piping and sprinklers which are interconnected. The system also includes a control valve and a device for actuating an alarm when the system is in operation.

Sprinkler Connection -A siamese connection used by the fire department for increasing the water supply and pressure to a sprinkler system.

Wet-Pipe Sprinkler System -An automatic sprinkler system in which the pipes are constantly filled with water under pressure.

Dry-Pipe Sprinkler System -A fire protection sprinkler system that has air instead of water under pressure in its piping; dry systems are often installed in areas subject to freezing.

Dry-Pipe Valve -A valve in a dry-pipe sprinkler system designed so that moderate air pressure will hold back a much greater water pressure.

Deluge Sprinkler System -A fire protection sprinkler system in which the sprinkler heads are always open. The system is controlled by a valve that is operated automatically or by a thermostatically-actuated device.

Pre-Action System -A type of automatic sprinkler system in which thermostatic devices are employed to charge the system with water before individual sprinkler heads are fused.

Fire Department Connection -Connections provided at ground level through which the fire department supplies sprinkler systems

or standpipe systems.

Post Indicator Valve (PIV) -A post-type valve that provides a visual means of indicating "open" or "shut" position. It is found on the supply main of installed fire protection systems.

OS & Y Valve -A type of outside screw and yoke valve used on piping or in pits connected to sprinkler systems. The position of the stem shows the valve to be either open or closed.

Sprinkler Alarm -An approved device installed so that any water flow from a sprinkler system equal to or greater than that from single automatic sprinkler will result in an audible alarm signal on the premises.

REQUIREMENTS

The requirements of this section apply to all automatic sprinkler systems installed to meet a particular OSH standard. For automatic sprinkler systems used to meet OSH requirements and installed prior to the effective date of this standard, compliance with the National Fire Protection Association (NFPA) or the National Board of Fire Underwriters (NBFU) standard in effect at the time of the system's installation will be acceptable as compliance with this section. Automatic sprinkler systems installed in workplaces, but not required by OSH, are exempt from the requirements of this section.

NOTE: Systems installed *solely* for property protection are not covered.

Design

There are two basic types of sprinkler system designs. Pipe schedule designed systems are based on pipe schedule tables developed to control hazards with standard size pipe, number of sprinklers, and

pipe lengths. Hydraulic designed systems are based on an engineered design of pipe size which will produce a given water density or flow rate at any particular point in the system. Either design can be used to comply with this standard.

The National Fire Protection Association's Standard No. 13, "Automatic Sprinkler Systems," contains the tables needed to design and install either type of system. Minimum water supplies, densities, and pipe sizes are given for all types of occupancies.

The employer may check with a reputable fire protection engineering consultant or sprinkler design company when evaluating existing systems or designing new installations.

With the advent of new construction materials for the manufacture of sprinkler pipe, materials, other than steel have been approved for use as sprinkler pipe. Selection of pipe material should be made on the basis of the type of installation and the acceptability of the material to local fire and building officials where such systems may serve more than one purpose.

Before new sprinkler systems are placed into service, an acceptance test is to be conducted. The employer should invite the installer, designer, insurance representative, and a local fire official to witness the test. Problems found during the test are to be corrected before the system is placed into service.

1910.159(c)(1)(i) All automatic sprinkler designs used to comply with this standard shall provide the necessary discharge patterns, densities, and water flow characteristics for complete coverage in a particular workplace or zoned subdivision of the workplace.

1910.159(c)(1)(ii) The employer shall assure that only approved equipment and devices are used in the design and installation of automatic sprinkler systems used to comply with this standard.

ADVISORY: Systems must be properly maintained. For example:

- Water supply valves open and checked regularly;
- Dry pipe valves are cleaned and reset annually (maintain air pressure in the system).

Maintenance

It is important that any sprinkler system maintenance be done only when there is minimal employee exposure to the fire hazard. For example, if repairs or changes to the system are to be made, they should be made during those hours when employees are not working or are not occupying that portion of the workplace protected by the portion of the system which has been shut down.

The procedures for performing a flow test via a main drain test or by the use of an inspector's test valve can be obtained from the employer's fire insurance company or from the National Fire Protection Association's Standard No. 13A, "Sprinkler System, and Maintenance."

1910.159(c)(2) The employer shall properly maintain an automatic sprinkler system installed to comply with this section. The employer shall assure that a main drain flow test is performed on each system **annually**. The inspector's test valve shall be opened **at least every two years** to assure that the sprinkler system operates properly.

Acceptance Tests

1910.159(c)(3) The employer shall conduct proper acceptance tests on sprinkler systems installed for employee protection after January 1, 1981, and record the dates of such tests. Proper acceptance tests include the following:

- < Flushing of underground connections.
- < Hydrostatic tests of piping in system.
- < Air tests in dry-pipe systems.
- < Dry-pipe valve operations; and
- < Test of drainage facilities.

Water Supplies

The water supply to a sprinkler system is one of the most important factors an employer should consider when evaluating a system. Obviously, if there is no water supply, the system is useless. Water supplies can be lost for various reasons such as improperly closed valves, excessive demand, broken water mains, and broken fire pumps. The employer must be able to determine if or when this type of condition exists either by performing a main drain test or visual inspection. Another problem may be an inadequate water supply. For example, a light hazard occupancy may, through rehabilitation or change in tenants, become an ordinary or high hazard occupancy. In such cases, the existing water supply may not be able to provide the pressure or duration necessary for proper protection. Employers must assure that proper design and tests have been made to assure an adequate water supply. These tests can be arranged through the employer's fire insurance carrier or through a local sprinkler maintenance company or through the local fire prevention organization.

Anytime the employer must shut down the primary water supply for a sprinkler system, the standard requires that equivalent protection be provided. Equivalent protection may include a fire watch with extinguishers or hose lines in place and manned, or a secondary water supply such as a tank truck and pump, or a tank or fire pond with fire pumps, to protect the areas where the primary water supply is limited or shut down. The employer may also require evacuation of the workplace and have an emergency action plan which specifies such actions.

1910.159(c)(4) The employers shall assure that every automatic sprinkler system is provided with at least one automatic water supply capable of providing design water flow for at least 30 minutes. An auxiliary water supply or equivalent protection shall be provided when the automatic water supply is out of service, except for systems of 20 or fewer sprinklers.

Hose Connections for Fire Fighting Use

1910.159(c)(5) The employer may attach hose connections for fire fighting use to wet pipe sprinkler systems provided that the water supply satisfies the

combined design demand for sprinklers and standpipes.

Protection of Piping

Piping which is exposed to corrosive atmospheres, either chemical or natural, can become defective to the extent that it is useless.

Employers must assure that piping is protected from corrosion by its material of construction, e.g., stainless steel, or by a protective coating, e.g., paint.

1910.159(c)(6) The employer shall assure that automatic sprinkler system piping is provided against freezing and exterior surface corrosion.

Drainage

1910.159(c)(7) The employer shall assure that all dry sprinkler pipes and fittings are installed so that the systems may be totally drained.

Sprinklers

1910.159(c)(8)(i) The employer shall assure that only approved sprinklers are used on systems.

1910.159(c)(8)(ii) The employer may not use older style sprinklers to replace standard sprinklers without a complete engineering review of the altered part of the system.

When an employer finds it necessary to replace components or otherwise change a sprinkler's design, the employer should make a complete fire protection engineering survey of that part of the system being changed. This review should assure that the changes to the system will not alter the effectiveness of the system as it is presently designed. Water supplies, densities and flow characteristics should be maintained.

1910.159(c)(8)(iii) The employer shall assure that sprinklers are protected from mechanical damage.

1910.159(c)(9) On all sprinkler systems having more than 20 sprinklers, the employer shall assure that a local water flow alarm is provided which sounds an audible signal on the premises upon water flow through the system equal to the flow from a single sprinkler.

The most recognizable sprinkler alarm is the water gong or bell that sounds when water begins to flow through the system. This is not the only type of acceptable water flow alarm. Any alarm that gives an indication that water is flowing through the system is acceptable. For example, a siren, a whistle, a flashing light, or similar alerting device which can transmit a signal to the necessary persons would be acceptable. The purpose of the alarm is to alert persons that the system is operating, and that some type of planned action is necessary.

1910.159(c)(10) The employer shall assure that sprinklers are spaced to provide a maximum protection area per sprinkler, a minimum of interference to the discharge pattern by building or structural members or building contents and suitable sensitivity to possible fire hazards. The **minimum vertical clearance between sprinklers and material below shall be 18 inches**. For a sprinkler system to be effective there must be an adequate flow discharge of water spray from the sprinkler head. Any obstruction which hinders the designed density or spray pattern of the water may create unprotected areas which can cause the fire to spread. There are some sprinklers that, because of the system's design, are deflected into specific areas. This type of obstruction is acceptable if it is taken into consideration in providing adequate coverage.

1910.159(c)(11) The employer shall assure that hydraulically designed automatic sprinkler systems or portions thereof are identified and that the location, number of sprinklers in the hydraulically designed section, and the basis of the design is indicated. Central records may be used in lieu of signs at sprinkler valves provided the records are available for inspection and copying by the Secretary of Labor.

ADVISORY: Automatic sprinkler systems are considered to be the most reliable of all fire protection devices, and an understanding of the system of pipes and valves and their operation is essential to the fire brigade members. If more than one sprinkler head is operating, the fire may be beyond the incipient stage. Additional information and assistance on the subject can be obtained from various sources or by contacting the "Division of Education and Training".

1910.160 - 1910.165

FIXED EXTINGUISHING SYSTEMS, FIRE DETECTION SYSTEMS AND EMPLOYEE ALARM SYSTEMS

DEFINITIONS

Automatic Fire Detection Devices -A device designed to automatically detect the presence of fire by heat, flame, light, smoke or other products of combination.

Carbon Dioxide -A colorless, odorless, electrically nonconductive inert gas (chemical formula CO₂) that is a medium for extinguishing fires by reducing the concentration of oxygen or fuel vapor in the air to the point where combustion is impossible.

Dry Chemical -An extinguishing agent composed of very small particles of chemicals such as, but not limited to, sodium bicarbonate, potassium chloride or monoammonium phosphate supplemented by special treatment to provide resistance to packing and moisture absorption (caking) as well as to provide proper flow capabilities. Dry chemical does not include dry powders.

Fixed Extinguishing System -A permanently installed system that either extinguishes or controls a fire at the location of the system.

Foam -A stable aggregation of small bubbles which flow freely over a burning liquid surface and form a coherent blanket which seals combustible vapors and thereby extinguishes the fire.

Gaseous Agent -A fire extinguishing agent which is in the gaseous state at normal room temperature and pressure. It has low viscosity, can expand or contract with changes in pressure and temperature, and has the ability to diffuse readily and to distribute itself uniformly throughout an enclosure.

Halon 1301 -A colorless, odorless, electrically nonconductive gas (chemical formula CBrF_3) which is a medium for extinguishing fires by inhibiting the chemical chain reaction of fuel and oxygen. It is also known as bromotrifluoromethane.

Inspection -A visual check of fire protection systems and equipment to ensure that they are in place, charged, and ready for use in the event of a fire.

Local Application System -A fixed fire suppression system which has a supply of extinguishing agent, with nozzles arranged to automatically discharge extinguishing agent directly on the burning material to extinguish or control a fire.

Maintenance -The performance of services on fire protection equipment and systems to assure that they will perform as expected in the event of a fire. Maintenance differs from inspection in that the maintenance requires the checking of internal fitting, devices and agent supplies.

Pre-Discharge Employee Alarm -An alarm which will sound at a

set time prior to actual discharge of an extinguishing system so that employees may evacuate the discharge area prior to system discharge.

Total Flooding System -A fixed suppression system which is arranged to automatically discharge a predetermined concentration of agent into an enclosed space for the purpose of fire extinguishment or control.

ASVISORY: Due to the phasing out of Halon production, the NFPA standard lists several nonconductive fire extinguishing agents that do not leave a residue that could be considered for replacement of the Halon in systems.

1910.160 - FIXED EXTINGUISHER SYSTEMS

Fixed extinguishing systems are designed and installed for fire suppression with minimal loss of property, equipment, processes and goods. They are used to protect dip tanks, spray painting booths and flammable liquid hazards. They are also recommended to protect areas where the contents are susceptible to water damage, such as fur and record vaults and computer rooms and equipment.

1910.160 through 1910.163 apply to all fixed extinguishing systems installed to meet a particular OSH standard except for automatic sprinkler systems which are covered by 1910.159.

ADVISORY: The standards which require fixed extinguisher systems include but are not necessarily limited to the following:

Dip tanks, 1910.108(c)(5)

Spray painting booths, 1910.107(b)(5)(iv) and 1910.107(h)(12)

Flammable liquid storage, 1910.106, Table H-13

1910.160(a)(2) Applies to those fixed extinguishing systems, generally total flooding, which are **not** required by OSH, but which,

because of the agent's discharge, may expose employees to hazardous concentrations of extinguishing agents or combustion by-products. Employees who work around fixed extinguishing systems must be warned of the possible hazards associated with the system and its agent. For example, fixed dry chemical extinguishing systems may generate a large enough cloud of dry chemical particles that employees may become visually disoriented. Certain gaseous agents can expose employees to hazardous by-products of combustion when the agent comes into contact with hot metal or other hot surfaces. Some gaseous agents may be present in hazardous concentrations when the system has totally discharged because an extra rich concentration is necessary to extinguish deep-seated fires. Certain local application systems may be designed to discharge onto the flaming surface of a liquid, and it is possible that the liquid can splatter when hit with the discharging agent. All of these hazards must be determined before the system is placed into operation, and must be discussed with employees.

Such systems are only subject to the requirements of 1910.160(b)(4) through (b)(7) and 1910.160(c).

Systems otherwise covered in 1910.160(a)(2), which are installed in areas with no employee exposure are exempt from the requirements of 1910.160.

1910.160(b)(1) System components and application of agents must be approved and designed for the specific fire hazard they are installed to control or extinguish.

ADVISORY: The following elements should be considered in the design of the system:

- › › agent concentration
- › › total agent quantity
- › › application rate
- › › pressure of the cylinder

- › › nozzle quantity and arrangement for coverage

1910.160(b)(2) If for any reason a fixed extinguishing system becomes inoperable, the employer shall notify employees and take the necessary temporary precautions to assure their safety until the system is restored to operating order. Any defect or impairments shall be properly corrected by trained personnel.

ADVISORY: Some possibilities are:

- * fire watch in area
- * hazardous operations discontinued
- * restriction of employee access to area

1910.160(b)(3) A distinctive alarm or signaling system which complied with 1910.165 is required to indicate that a fixed system is discharging. Such a signal is necessary on those systems where it is not immediately apparent that the system is discharging. For example, certain gaseous agents make a loud noise when they discharge. In this case no alarm signal is necessary. However, where systems are located in remote locations or away from the general work area and where it is possible that a system could discharge without anyone knowing that it is doing so, then a distinctive alarm is necessary to warn employees of the hazards that may exist. The alarm can be a bell, gong, whistle, horn, flashing light, or any combination of signals as long as it is identifiable as a discharge alarm.

1910.160(b)(4) The employer shall provide effective safeguards to warn employees against entry into discharge areas where the atmosphere remains hazardous to employee safety or health.

ADVISORY: There should also be a method to warn employees against reentry into a space flooded with extinguishing agent. This could be:

- › a continuation of the discharge alarm

- › separate warning light
- › physical barrier
- › employee guard

1910.160(b)(5) The employer shall post hazard warning or caution signs at the entrance to, inside of, areas protected by fixed extinguishing systems which use agents in concentrations known to be hazardous to employee safety and health.

1910.160(b)(6) The employer shall assure that fixed systems are inspected annually by a person knowledgeable in the design and function of the system to assure that the system is maintained in good operating condition.

ADVISORY: The employer is responsible for the maintenance of all fixed systems; but this responsibility does not preclude the use of outside contractors to do such work. New systems should be subjected to an acceptance test before placed in service. The employer should invite the installer, designer, insurance representatives and others to witness the test. Problems found during the test need to be corrected before the system is considered operational.

1910.160(b)(9) The employer shall assure that inspection and maintenance dates are recorded on the container, on a tag attached to the container, or in a central location. A record of the last **semi-annual check** shall be maintained until the container is checked again or for the life of the container, whichever is less.

1910.160(b)(11) The employer shall not use chlorobromomethane or carbon tetrachloride as an extinguishing agent where employees may be exposed.

ADVISORY: Based on the known toxicological effects of agents such as carbon tetrachloride and chlorobromomethane, KOSH is not permit-ting the use of these agents in areas where employees can be exposed to the agent or its side effects. However, chlorobromomethane has been accepted and may be used as an explosion suppression agent in unoccupied spaces. KOSH is permitting the use of this agent only in areas where employees will not be exposed.

1910.160(b)(12) The employer shall assure that systems installed in the presence of corrosive atmospheres are constructed of non-corrosive material or otherwise protected against corrosion.

ADVISORY: Where components are subject to corrosion, corrosion protection must be provided by:

- › non-corrosive materials (i.e., stainless steel)
- › wax coatings
- › paint protection

Paint on operating components should be factory applied. Field applied paint can cause malfunction of sensitive parts.

1910.160(b)(15) The employer shall assure that at least one manual station is provided for discharge activation of each fixed extinguishing system.

ADVISORY: There are instances, such as for mechanical reasons and others, where the standards call for a manual back-up activation device. While the location of this device is not specified in the standard, the employer should assume that the device should be located where employees can easily reach it. It could, for example, be located along the main means of egress from the protected area so that employees could activate the system as they evacuate the work area.

1910.160(b)(16) The employer shall assure that manual operating devices are identified as to the hazard against which they will provide protection.

1910.160(b)(17) The employer is required to provide the necessary personal protective equipment to rescue employees who may be trapped in a totally flooded environment which may be hazardous to their health. The equipment would normally include a positive-pressure self-contained breathing apparatus and any necessary first aid equipment. In cases where the employer can assure the prompt arrival of the local fire department or plant emergency personnel which can provide the equipment, this can be considered as complying with the standards.

Total flooding systems with potential health and safety hazards to employees.

1910.160(c)(1) The employer shall provide an emergency action plan in accordance with 1910.38 for each area within a workplace that is protected by a total flooding system which provides agent concentrations exceeding the maximum safe levels set forth in paragraphs (b)(5) and (b)(6) of 1910.162.

ADVISORY: Requirements of this paragraph apply to systems in areas that employees could possibly enter either during or after system operation.

There must be an emergency action plan (see 1910.38) for each area where agent concentration could exceed the maximum safe level. This includes:

- < any CO system of 4% or more
- < any Halon 1211 system of 4% or more
- < Halon 1301 systems with a designed concentration of 10% or more

Halon replacement (Clean Agents) that reduces the oxygen below 19.5 %

These systems must be automatically actuated, with fire detectors interconnected to pre-discharge alarms. The alarm must provide sufficient time for employee escape before the system discharges.

1910.160(c)(2) Systems installed in areas where employees cannot enter during or after the system's operation are exempt from the requirement of paragraph (c) of this section.

1910.160(c)(3) On all total flooding systems the employer shall provide a **pre-discharge employee alarm** which complies with 1910.165, and is capable of being perceived above ambient light or noise levels before the system discharges, which will give employees time to safely exit from the discharge area prior to system discharge.

1910.160(c)(4) The employer shall provide automatic actuation of total flooding systems by means of an approved fire detection device installed and interconnected with a **pre-discharge employee alarm system** to give employees time to safely exit from the discharge area prior to system discharge.

1910.161

FIXED EXTINGUISHER SYSTEMS, DRY CHEMICAL

The requirements of this section apply only to dry chemical systems. These requirements are to be used in conjunction with the requirements of 1910.160.

1910.161(b)(1) The employer shall assure that dry chemical agents are compatible with any foams or wetting agents with which they are used.

1910.161(b)(2) The employer may not mix together dry chemical extinguishing agents of different compositions. The employer shall assure that dry chemical systems are refilled with the chemical stated on the approval nameplate or an equivalent compatible material.

1910.161(b)(3) When dry chemical discharge may obscure vision, the employer shall provide a pre-discharge employee alarm which complies with 1910.165 and which will give employees time to safely exit from the discharge area prior to system discharge.

ADVISORY: Pre-discharge alarms are needed on dry chemical systems only when the dry chemical discharge could obstruct vision, such as:

- › equipment located along a main egress route

- › equipment in a confined space where employees in the immediate area could have difficulty seeing their way out.

1910.161(b)(4) The employer shall sample the dry chemical supply of all but stored pressure systems at least annually to assure that the dry chemical supply is free of moisture which may cause the supply to cake or form lumps.

ADVISORY: The employer is responsible for assuring that dry chemical systems will operate effectively. To do this, periodic maintenance is necessary. One test that must be conducted during the maintenance check is one which will determine if the agent has remained free of moisture. If an agent absorbs any moisture, it may tend to cake and thereby clog the system. An easy test for acceptable moisture content is to take a lump of dry chemical from the container and drop it from a height of four inches. If the lump crumbles into fine particles, the agent is acceptable.

1910.161(b)(5) The employer shall assure that the rate of application of dry chemicals is such that the designed concentration of the system will be reached within 30 seconds of initial discharge.

1910.162 - FIXED EXTINGUISHING SYSTEMS, GASEOUS AGENTS

SCOPE & APPLICATION

1910.162(a)(1) This section applies to all fixed extinguishing systems, using a gas as the extinguishing agent, installed to meet a particular OSHA standard. These systems shall also comply with 1910.160. In some cases, the gas may be in a liquid state during storage.

1910.162(a)(2) The requirements of paragraphs (b)(2) and (b)(4) through (b)(6) shall apply only to total flooding systems.

SPECIFIC REQUIREMENTS

1910.162(b)(1) Agents used for initial supply and replenishment shall be of the type approved for the system's application.

ADVISORY: A system designed for one agent cannot use another agent without significant redesign. (Halon 1301 and Halon 1211 are not interchangeable.)

1910.162(b)(2) Except during overhaul, the employer shall assure that the designed concentration of gaseous agents is maintained until the fire has been extinguished or is under control.

ADVISORY: A critical factor in total flooding systems is the ability to maintain the concentration of agent in the room or space until the fire goes out. The following are common sources of leakage:

- › ventilation fans and ducts
- › door, window, and conveyor openings
- › floor drains, etc.

These openings must be:

- › closed to minimize leakage, or
- › additional agent must be provided to allow for the agent loss

1910.162(b)(3) The employer shall assure that employees are not exposed to toxic levels of gaseous agent or its decomposition products

Toxic decomposition - Certain halogenated hydrocarbons will break down or decompose when they are combined with high temperatures found in the fire environment. The products of the decomposition can include toxic elements or compounds. For example, when Halon 1211 is placed into contact with hot metal it will break down and form bromide or fluoride fumes. The employer must find out which toxic

products may result from decomposition of a particular agent from the manufacturer, and take the necessary precautions to prevent employee exposure to the hazard.

One problem encountered with Halon extinguishing systems is the toxic decomposition products when Halon is exposed to temperatures over 950° F.

Products include inorganic acids and carbonyl halides, such as:

- < hydrogen fluoride (HF)
- < hydrogen bromide (HBr)
- < carbonyl bromide (COBr)

The best controls to minimize toxicity problems are:

- < adequate design concentration
- < automatic operation
- < rapid application
- < employee evacuation of discharge area

1910.162(b)(4) The employer shall assure that the design extinguishing concentration is reached **within 30 seconds** of initial discharge except for Halon systems which must achieve design concentration **within 10 seconds**.

ADVISORY: This allows the fire to be extinguished before surfaces are heated, and minimizes the decomposition products.

Design Concentrations – Total flooding systems are based on the volume of gas which must be discharged in order to produce a certain designed concentration of gas in an enclosed area. The concentration needed to extinguish a fire depends on several factors including the type of fire hazard and the amount of gas expected to leak away from the area during discharge. At times it is necessary to “super-saturate” a work area to provide for expected leakage from the enclosed area.

In such cases, employers must assure that the flooded area has been ventilated before employees are permitted to reenter the work area without protective clothing and respirators.

1910.162(b)(5) The employer shall provide a distinctive pre-discharge employee alarm capable of being perceived above ambient light or noise levels when agent design concentrations exceed the maximum safe level for employee exposure. A pre-discharge employee alarm for alerting employees before system discharge shall be provided on Halon 1211 and carbon dioxide systems with a design concentration of 4 percent or greater and for Halon 1301 system with a design concentration of 10 percent or greater. The pre-discharge employee alarm shall provide employees time to safely exit the discharge area prior to system discharge.

1910.162(b)(6)(i) Where egress from an area cannot be accomplished within one minute, the employer shall not use Halon 1301 in a concentration greater than 7 percent.

(ii) Where egress takes greater than 30 seconds but less than one minute, the employer shall not use Halon 1301 in a concentration greater than 10 percent.

(iii) Halon 1301 **concentrations greater than 10 percent** are only permitted in areas not normally occupied by employees provided that any employee in the area can escape within 30 seconds. The employer shall assure that no unprotected employees enter the area during agent discharge.

ADVISORY: Halon replacements such as Interger, Sapphire 3M Novec 1230, work by reducing the oxygen below 15%. The employer shall assure that no unprotected employees enter the area during agent discharge.

1910.163 - FIXED EXTINGUISHING SYSTEMS, WATER SPRAY AND FOAM

This section applies to those systems to use water spray or foam. **The**

requirements of 1910.160 also apply to this type of system.

1910.163(b)(1) The employer shall assure that foam and water spray systems are designed to be effective in at least controlling fire in the protected area or on protected equipment.

ADVISORY: System selection and design has to be effective for the protected hazard. Selection of foam is a critical factor. Two general categories of foam are:

- › high expansion
- › low expansion

High expansion foam produces 100 to 1,000 gallons of foam per gallon of water and foam solution-light stiff foam with little water content. Because of the high volume output, it fills protected volumes very quickly. Because of its light weight, it tends to blow away if used outdoors.

Common uses:

- < aircraft hangars
- < basements
- < warehouses
- < other large confined spaces
- < flammable liquid hazards

Not suitable for:

- < any outdoor application
- < combustible metal fires

Low expansion foams with expansion ratios of 6-10:1 produce a wet, sloppy foam with a higher water content. They extinguish fires by forming a blanket over the burning material, and by a cooling effect. They are commonly used for flammable liquid hazards, such as:

- < tank farms
- < dip tanks
- < piped lube oil systems, etc.

They are not good for combustible metal fires.

Common flammable liquids are also divided into two categories polar and non-polar. Common polar solvents are:

- < alcohol
- < acetone
- < other ketones

Common non-polar flammable liquids are:

- < hexane
- < toluene
- < gasoline
- < paint thinners
- < lube oils

Common foams are suitable only for non-polar solvents. Special foams are required for polar flammable liquids. These are known as alcohol type foams or polar solvent foams.

ADVISORY: When selecting the type of foam for a specific hazard, the employer should consider the following limitations of some foams.

- a. Some foams are not acceptable for use on fires involving flammable gases and liquefied gases with boiling points below ambient workplace temperatures. Other foams are not effective when used on fires involving polar solvent liquids.
- b. Any agent using water as part of the mixture should not be used on fire involving combustible metals unless it is applied under proper conditions to reduce the temperature of burning metal below the ignition temperatures. The employer should use only those foams that have been tested and accepted for this application by a recognized independent testing laboratory.

c. Certain types of foams may be incompatible and break down when they are mixed together.

d. For fires involving water miscible solvents, employers should use only those foams tested and approved for such use. Regular protein foams may not be effective on such solvents.

1910.163(b)(2) The employer shall assure that drainage of water spray systems is directed away from areas where employees are working and that no emergency egress is permitted through the drainage path.

ADVISORY: Whenever employers provide a foam or water spray system, drainage facilities must be provided to carry contaminated water or foam overflow away from the employee work areas and egress routes. This drainage system should drain to a central impounding area where it can be collected and disposed of properly. Other government agencies may have regulations concerning environmental considerations.

Both foam and water spray systems can present a hazard to employees in the discharge area. Extinguishing agents in these systems can wash burning liquid away from the fire into surrounding areas. A dike keeps liquid away from work areas and egress paths where employees could be exposed.

This may require a combination of:

< dikes

< curbs

< floor slopes

< drains to channel the flow through safe areas.

1910.164 - FIRE DETECTION SYSTEMS

SCOPE & APPLICATION

1910.164(a) This section applies to all automatic fire detection systems installed to meet the requirements of a particular OSH standard.

ADVISORY: An example would be 1910.160(b)(13).

INSTALLATION & RESTORATION

1910.164(b)(1) The employer shall assure that all devices and equipment constructed and installed to comply with this standard are approved for the purpose for which they are intended.

ADVISORY: Four general types of heat detectors:

- › fixed temperature
- › rate-of-rise
- › rate compensation (anticipation)
- › combination rate-of-rise and fixed temperature

Uses of Smoke Detectors

Smoke detectors are particularly useful when anticipated fire would produce smoke and combustion products before heat. Principle applications:

- < areas of human occupancy
- < high value or critical areas
- < computer rooms
- < control rooms

ADVISORY: Fire detection system must be designed by knowledgeable engineers or other professionals with expertise in fire

detection systems. When the systems are installed, there should be an acceptance test performed on the system to insure it operates properly. The manufacturer's recommendations for system design should be consulted. While entire systems may not be approved, each component used in the system is required to be approved. Custom fire detection systems should be designed by knowledgeable fire protection or electrical engineers who are familiar with the workplace hazards and conditions. Some systems may only have one or two individual detectors for a small workplace, but good design and installation is still important. An acceptance test should be performed on all systems, including these smaller systems.

1910.164(b)(2) The employer shall restore all fire detection systems and components to normal operating conditions as promptly as possible after each test or alarm. Spare detection devices and components which are normally destroyed in the process of detecting fires shall be available on the premises or from a local supplier in sufficient quantities and locations for prompt restoration of the system.

ADVISORY: This does not mean that the parts or components have to be stored at the workplace. If the employer can assure that the supply of parts is available in the local community or the general metropolitan area of the workplace, then the requirements for storage and availability have been met. The intent is to make sure that the alarm system is fully operational when employees are occupying the workplace, and that when the system becomes inoperable it can be returned to full service the next day or sooner.

MAINTENANCE & TESTING

1910.164(c)(1) The employer shall maintain all systems in a operable condition except during repairs or maintenance.

ADVISORY: No specific method or interval is established for maintenance. Refer to the manufacturer's instructions for each specific system.

1910.164(c)(2) The employer shall assure that fire detectors and fire detection systems are tested and adjusted as often as needed to maintain proper reliability and operating condition except that factory calibrated detectors need not be adjusted after installation.

1910.164(c)(3) The employer shall assure that pneumatic and hydraulic operated detection systems installed after January 1, 1981, is equipped with supervised systems.

ADVISORY: Fire detection systems should be supervised. The object of supervision is detection of any failure of the circuitry, and the employer should use any method that will assure that the system's circuits are operational. Electrically operated sensors for air pressure, fluid pressure, or electrical circuits, can provide effective monitoring and are the typical types of supervision.

Supervision is a specific term related to electrical circuitry. Monitoring is a more general term, which could include use of pressure switches to detect air leaks in pneumatic systems or similar approaches.

For some types of systems, there is no mechanical or electrical device which can monitor system performance. In this case, monitoring might only be a frequent testing program.

1910.164(c)(4) The employer shall assure that the servicing, maintenance and testing of fire detection systems, including cleaning and necessary sensitivity adjustments are performed by a trained person knowledgeable in the operations and functions of the system.

1910.164(c)(5) The employer shall also assure that fire detectors that need to be cleaned of dirt, dust, or other particulates in order to be fully operational are cleaned at regular periodic intervals.

PROTECTION OF FIRE DETECTORS

1910.164(d)(1) The employer shall assure that fire detection equipment installed outdoors or in the presence of corrosive atmospheres to be protected from corrosion. The employer shall provide a canopy, hood, or other suitable protection for detection equipment requiring protection from the weather.

ADVISORY: Fire detectors must be protected from corrosion either by protective coatings, by being manufactured from non-corrosive materials or by location. Detectors must also be protected from mechanical impact damage, either by suitable cages or metal guards where such hazards are present, or by locating them above or out of contact with materials or equipment which may cause damage.

Equipment installed outdoors or in corrosive atmospheres must be protected from corrosion by the use of:

- < non-corrosive materials
- < wax-coated components
- < factory painted components

Equipment must also be protected from mechanical and physical impact by:

- < shields or guards
- < building configurations or location

RESPONSE TIME

1910.164(e)(1) The employer shall assure that fire detection systems installed for the purpose of actuating fire extinguishment or suppression systems shall be designed to operate in time to control or extinguish a fire.

1910.164(e)(2) The employer shall assure that fire detection systems installed for the purpose of employee alarm and evacuation be designed and installed to provide a warning for emergency action and safe escape of employees.

1910.163(e)(3) The employer **shall not delay alarms** or devices initiated by fire detector actuation for **more than 30 seconds** unless such delay is

necessary for the immediate safety of employees. When such delay is necessary, it shall be addressed in an emergency action plan meeting the requirements of 1910.38.

ADVISORY: Employers may want a delay to give time to:

- › shut down hazardous operations
- › get evacuation monitors in positions
- › prepare for evacuation

These reasons would be acceptable, if they actually improve employee safety.

Employers may also want a delay to:

- › avoid the cost of discharging a fire suppression system
- › avoid disrupting production

This is acceptable *only* up to 30 seconds. A longer delay is not allowed by the standard.

NUMBER, LOCATION & SPACING OF DETECTION DEVICES

1910.164(f) The employer shall assure that the number, spacing and location of fire detectors is based upon design data obtained from field experience, or tests, engineering surveys, the manufacturer's recommendations, or a recognized testing laboratory listing. This information can also be obtained from the approved listing for detectors or NFPA standards. It can also be obtained from fire protection engineers, consultants or manufacturers of equipment who have access to approval listing and design methods.

ADVISORY: Spacing of fire detectors is a complex subject. Each

type and model of detector has its own spacing requirements, based on testing laboratory data, manufacturer's recommendations, or approval lab listings.

Heat detector spacing **guidelines**:

- < 15 to 20 feet apart

- < based on actual fire tests

In the fire tests, the time of operation of automatic sprinklers is compared to time of operation of the detectors.

- < heat detector must operate before the sprinkler.

For smoke detectors, **guidelines** spacing are 30 feet.

U.L. tests detectors on a smooth ceiling, without obstructions.

Adjustments must be made for other ceiling configurations.

Detectors should be mounted:

- < ceiling preferred

- < wall acceptable

- < not within 6 inches of intersection between ceiling and wall

Ceiling height becomes critical when it exceeds 16 feet.

For ceiling heights over 30 feet, detectors are generally needed at two levels:

- < one-half at the ceiling

- < other half 3 feet below

Surveys by a fire protection engineer or consultant, or a qualified manufacturer, are the only ways to determine whether spacing is appropriate.

1910.165 - EMPLOYEE ALARM SYSTEMS

SCOPE & APPLICATION

1910.165(a)(1) This section applies to all emergency employee alarms installed to meet a particular OSH standard. This section does not apply to those discharge or supervisory alarms required on various fixed extinguishing systems or to supervisory alarms on fire suppression, alarm or detection systems unless they are intended to be employee alarm systems.

The following is a list of standards (not intended to be all-inclusive) which refer to employee alarm systems:

1910.38(d)

1910.160(c)(3)

1910.161(b)(3)

1910.162(b)(5)

ADVISORY: This section is intended to apply to employee alarm systems used for all types of employee emergencies except those which occur so quickly and at such a rapid rate (e.g., explosion) that any action by the employee is extremely limited following detection.

In small workplaces of 10 or less employees the alarm system can be by direct voice communication (shouting) where any one individual can quickly alert all other employees. Radio may be used to transmit alarms from remote workplaces where telephone service is not available, provided that radio messages will be monitored by emergency services, such as fire, police or others, or insure alarms are transmitted and received.

1910.165(a)(3) All pre-discharge employee alarms installed to meet a particular OSH standard shall meet the requirements of 1910.165(b)(1) through (b)(4), (c), and (d)(1).

GENERAL REQUIREMENTS

1910.165(b)(1) The employee alarm system shall provide warning for necessary emergency action as called for in the emergency action plan, or for reaction time for safe escape of employees from the workplace or the immediate work area, or both.

Alarm systems include three components:

- < signal devices to alert occupants
- < alarm initiating devices
- < control equipment

1910.165(b)(2) The employee alarm shall be capable of being perceived above ambient noise or light levels by all employees in the affected portions of the workplace. Tactile devices may be used to alert those employees who would not otherwise be able to recognize the audible or visual alarm.

ADVISORY: In recognition of physically impaired individuals, OSH is accepting various methods of giving alarm signals. For example, visual, tactile or audible alarm signals are acceptable methods of giving alarms to employees. Flashing lights or vibrating devices can be used in areas where the employer has hired employees with hearing or vision impairments. Vibrating devices, air fans, or other tactile devices can be used where visually and hearing impaired employees work. Employers are cautioned that certain frequencies of flashing lights have been claimed to initiate epileptic seizures in some employees and that this fact should be considered when selecting an alarm device. Two way radio communications would be most appropriate for transmitting emergency alarms in such workplaces which may be remote or where telephones may not be available.

1910.165(b)(3) The employee alarm shall be distinctive and recognizable

as a signal to evacuate the work area or to perform actions designated under the emergency action plan.

ADVISORY: Alarm signals must be perceived above normal conditions in the workplace. While not a specific standard, it is generally acceptable that audible alarms producing sound levels 5 to 15 dBA above ambient sound level are adequate; however, the sound levels must not exceed the safe level for employee's exposure.

Alarms should be readily recognizable as such, and must be distinctive from other common sounds, such as:

- < elevator call bells
- < lunch or quitting time bells
- < truck back-up alarms

1910.165(b)(4) The employer shall explain to each employee the preferred means of reporting emergencies, such as manual pull box alarms, public address systems, radio or telephones. The employer shall post emergency telephone numbers near telephones, or employee notice boards, and other conspicuous locations when telephones serve as a means of reporting emergencies. Where a communication system also serves as the employee alarm system, all emergency messages shall have priority over all non-emergency messages.

1910.165(b)(5) The employer shall establish procedures for sounding emergency alarms in the workplace. For those employers with 10 or fewer employees in a particular workplace, direct voice communication is an acceptable procedure for the alarm provided all employees can hear the alarm. Such workplaces need to have a back-up system.

ADVISORY: Employee alarms may require different means of reporting, depending on the workplace involved. For example, in small workplaces, a simple shout throughout the workplace may be sufficient to warn employees of a fire or other emergency. In larger workplaces, more sophisticated equipment is necessary so that entire plants or high-rise buildings are not evacuated for one small

emergency. In remote areas, such as pumping plants, radio communication with a central base station may be necessary. The goal of this standard is to assure that all employees who need to know that an emergency exists can be notified of the emergency. The method of transmitting the alarm should reflect the situation found at the workplace.

Personal radio transmitters, worn by an individual, can be used where the individual may be working such as in a remote location. Such personal radio transmitters shall send a distinct signal and should clearly indicate who is having an emergency, the location, and the nature of the emergency. All radio transmitters need a feedback system to assure that the emergency alarm is sent to the people who can provide assistance.

For multi-story buildings or single story buildings with interior walls for subdivisions, the more traditional alarm systems are recommended. Supervised telephone or manual fire alarm or pull box stations with paging systems to transmit messages throughout the building is the recommended alarm system. The alarm box stations should be available within a travel distance of 200 feet (61 m). Water flow detection on a sprinkler system, fire detection systems (guard's supervisory station) or tour signal (watchman's service) or other related systems may be part of the overall system. The paging system may be used for non-emergency operations provided the emergency messages and uses will have precedence over all other uses of the system.

INSTALLATION & RESTORATION

1910.165(c)(1) The employer shall assure that all devices, components, combinations of devices or systems constructed and installed to comply with this standard are approved. Steam whistles, air horns, strobe lights or similar lighting devices, or tactile devices meeting the requirements of this section are considered to meet this requirement for approval.

1910.165(c)(2) The employer shall assure that all employee alarm systems are restored to normal operating condition as promptly as possible after each test or alarm. Spare alarm devices and components subject to wear or destruction shall be available in sufficient quantities and locations for

prompt restoration of the system.

MAINTENANCE & TESTING

1910.165(d)(1) The employer shall assure that all employee alarm systems are maintained in operating condition except when undergoing repairs or maintenance.

1910.165(d)(2) The employer shall assure that a test of the reliability and adequacy of non-supervised employee alarm systems is made every two months. A different actuation device shall be used in each test of a multi-actuation device system so that no individual device is used for two consecutive tests.

1910.165(d)(3) The employer shall maintain or replace power supplies as often as is necessary to assure the fully operational condition. Back-up means of alarm, such as employee runners or telephones, shall be provided when systems are out of service.

1910.165(d)(4) The employer shall assure that employee alarm circuitry installed after January 1, 1981, which is capable of being supervised is supervised and that it will provide positive notification to assigned personnel whenever a deficiency exists in the system. The employer shall assure that all supervised employee alarm systems are tested at least annually for reliability and adequacy.

ADVISORY: Certain devices, such as air horns, cannot be supervised with present technology but can be monitored by inspection and testing. As multi-device systems are tested, different manual actuation devices should be used each time, so that the entire system eventually gets tested.

1910.165(d)(5) The employer shall assure that the servicing, maintenance and testing of employee alarms are done by persons trained in the designed operation and functions necessary for reliable and safe operation of the system.

MANUAL OPERATION

1910.165(e) The employer shall assure that manually operated actuation

devices for use in conjunction with employee alarms are unobstructed, conspicuous and readily accessible

ADVISORY: Evaluation of Employee Alarm Systems

If workplace is very small

- › all employees likely to be aware of a fire, or
- › any one employee capable of alerting all others without mechanical assistance then an alarm system would *not* be needed.

If alarm system is needed, it may range from

- › simple alarm device controlled by manual pull station, to
- › complex system with a variety of sounding devices and/or
- › lights, and control equipment with voice announcing capabilities

The control equipment consists of a control panel and logic circuits which determine how the system is to function.

The control panel shows system status and allows for operator action and contains any or all of the following items:

- › Visual indicators (lamps of system status)
- › Visual Plain English Display of System Status
- › Special Panel Tones for System Status
- › Reset Switches
- › Test Switches
- › Selection switches for Areas of Alarm Signals

- › Selection Switches of Various Emergency Signaling Tones
- › Voice Communication Devices (Microphone)
- › Paper Printout Machines for Permanent Copy
- › Requires Access Key for Authorized Personnel Only

The control logic circuits accept the signals from the various heat, smoke, and flame detectors, etc., and determine which and what type of signals are to be sounded on the alarm system. The control logic circuit is always checking itself (supervision) and if the system is not operating properly it will sound a special trouble signal within the control panel. This alerts trained personnel of system problems.

The complexity of the system should be tailored to the complexity of the workplace.

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Frankfort, Kentucky 40601
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